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No. XIV. OF VOL. II., 1928.
No. 5484. Vol. CCXV.

LONDON, SATURDAY, OCTOBER 6, 1928
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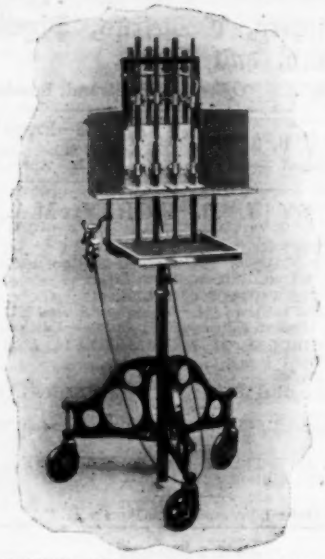

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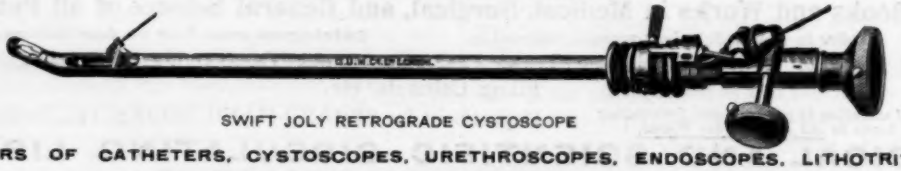

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A Lecture
ON
HYDROCEPHALUS.
A STUDY IN PHYLOGENY AND PATHOLOGY.

Being the Opening Lecture at St. George's Hospital Medical School on Oct. 1st, 1928,

BY SIR JOHN BLAND-SUTTON, BART., F.R.C.S. ENG.

HYDROCEPHALUS is a convenient Greek compound word signifying a watery head. The skulls of hydrocephalic infants litter the shelves of our museums and dismal bills of mortality do not furnish a true estimate of the frequency of this condition. The orifice through which the fœtus is impelled in order to be born is not sufficiently accommodating to allow the enlarged head to escape serious damage, and on the museum shelves these expanded skulls lie like so many withered buds!

Congenital hydrocephalus is due to an abnormal accumulation of fluid in the ventricles of the brain. In typical examples, the large size of the cranium and the smallness of the face are in striking contrast. The gradual increase of the fluid within the ventricles distends them causing wide separation of the cranial bones, while the bones of the face retain their natural proportions and relations to each other. The halves of the frontal bones are widely separated from each other; the spaces between the parietals, and between these and the occipital are wider than usual (Fig. 1). Indeed, the bones of the cranial vault are so disparted while those of the skull-base retain their usual juxta-

FIG. 1.

Skull of a hydrocephalic infant. ("Tumours.")

position, that the bones in the vault of a hydrocephalic skull were compared by Trousseau to the petals of an opening flower.

THE LATERAL RECESSES OF THE FOURTH VENTRICLE.

Previous to the publication of the "Origin of Species" (1859), and particularly the "Descent of Man" (1871), rudimentary organs in man's body were regarded by anatomists as curiosities. Many were known. They were galvanised into life by Darwin's conception of the Descent of Man. Human anatomy soon convinced me of the light evolution shed on rudimentary organs—Vestiges.

In 1879, while engaged at the Middlesex Hospital in preparing specimens of the brain for teaching purposes, my attention was arrested by a tuft of choroid plexus on each side of the cerebellum immediately adjacent to the flocculus. At that date no reference was made to these tufts in English textbooks of anatomy (Fig. 2); they mark the orifices of the lateral recesses of the fourth ventricle of the brain. They were described in 1849 by Bochdalek, Professor of Anatomy in Prague, who likened them to a basket

FIG. 2.

Under surface of the pons and medulla showing tufts of choroid plexus peering from the orifices of the lateral recesses. (Henle.)

of flowers—"Blumenkorbschen," or fullhorn (cornucopia). For many years anatomists took little notice of them.

When a brain is carefully hardened in alcohol and divided transversely through the pons and the cerebellum, so as to include the lateral recesses, the anatomist at once recognises that the tufts which form the flowers in Bochdalek's "Blumenkorbschen" are continuous with the choroid plexus covering the roof of the fourth ventricle, and that the wall of the recess is in contact with the auditory nerve (Fig. 3).

The orifice of each lateral recess is in contact with a depression on the inner wall of the petrous portion of the temporal bone which lodges the bulbous end of the endolymphatic duct. In 1884 I drew attention to this relationship and have for many years sought to find out its meaning. It is brimful of interest as I will endeavour to explain.

The brain and spinal cord are originally a tube of epiblast of which the anterior end consists of three inter-communicating bulbs—the three primary vesicles. These vesicles are represented in the adult brain by the third ventricle, the aqueduct of Sylvius, and the fourth ventricle, which is in direct communication with the central canal of the spinal cord. The paired lateral ventricles of the adult brain are out-growths from the first primary vesicle. (Fig. 4.)

The third vesicle concerns us for the moment—its floor thickens; its cavity becomes rhomboidal and it is recognised in the adult brain as the fourth ventricle. Its roof remains as a thin lamina—the velum. Chorionic villi sprout from the ventricular surface of the velum. There are no observations which enable us to fix the date when the lateral angles of this rhomboid ventricle burst into the subarachnoid space; probably this happens when the chorionic villi become active, and the pressure of the fluid within it makes vents through the two least resisting parts of its walls.

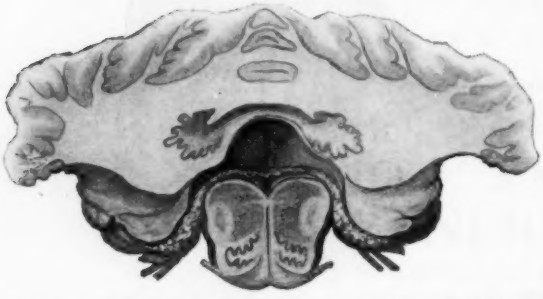
THE CHOROID PLEXUS AND THE VENTRICULAR FLUID.

The cerebro-spinal fluid is secreted by the choroid plexus and fills all the cavities of the brain; it escapes through the lateral recesses into the subarachnoid spaces. The manner of its escape from these spaces is not understood, but it is inferred that the fluid is absorbed by the veins and is discharged into the venous sinuses of the dura.

The choroid plexus is active about the fourth month of intra-uterine life, and if the escape of the fluid from the ventricle is hindered, the cavities of the brain above the blockade are dilated by the pressure of the accumulated fluid (Fig. 5). Obstruction to the escape of the ventricular fluid produces an effect on the brain parallel to that which occurs in a kidney when the urine is hindered from escaping from the ureter, and known as hydronephrosis.

Congenital hydrocephalus and congenital hydronephrosis are parallel conditions; they arise during intra-uterine life. The epithelium of the kidney and

FIG. 3.



Transverse section through the cerebellum and pons displaying the lateral recesses of the fourth ventricle and their relation to the auditory nerve. (Henle.)

the choroid plexuses of the brain are active about the fourth month of intra-uterine life.

The choroid plexuses perform a similar function for the brain which the renal epithelium exercises for the body generally. These plexuses may be styled cerebral kidneys, but with this difference: urine is collected in a bladder from which it is expelled intermittently. Cerebro-spinal fluid is in some measure reintroduced into the blood. Urine is noxious to blood.

The function of the cerebro-spinal fluid is ill-understood; its excessive accumulation and retention in the ventricles of the brain does not induce toxic symptoms. It is the pressure of a gross quantity which leads to disaster. The unrestrained escape of this fluid is fatal to children; there is strong clinical evidence that it has a definite toxicity for the rest of the body, for when liberated into the tissues, high fever is apt to occur during the short period before its absorption is arrested by the inevitable reaction in the tissues that produces encystment (Trotter).

Complete obstruction of the interventricular communications is as inimical to life as complete obstruction to both ureters.

The embryology of the brain clearly indicates that the primary vesicles form a closed sac; the lateral recesses are pouchings from the third vesicle and their communication with the subarachnoid area is a secondary event. If the lateral recesses fail to open into the subarachnoid space, the ventricular fluid is retained and leads to dilatation of all the ventricular cavities of the brain; this brings congenital hydrocephalus, due to imperforate lateral recesses, into line with fœtal hydronephrosis.

In order to appreciate the evolutionary significance of the lateral recesses, it is necessary to examine the auditory capsule in the cartilaginous stage of the skull.

THE HUMAN CHONDROCRANIUM.

At the time I began to study the significance of the ateral recesses, I was also concerned with man's skull in its cartilaginous condition (Fig. 6). This figure I prepared for my article on Osteology in Morris's "Human Anatomy," 1893.

On the inner face of the periotic cartilage there is a discrete orifice posterior to the internal auditory meatus; it is known as the aqueductus vestibuli, and contains the endolymphatic duct which ends as a bulb, or sac, under the dura. The orifice of each lateral recess of the fourth ventricle lies in contact with this bulb. From a careful consideration of this anatomical proximity I felt sure that some intimate relationship was indicated between the ventricular fluid of the brain and the endolymph of the labyrinth.

THE AUDITORY ORGAN AND ITS LABYRINTH.

The periotic capsule contains the organ of hearing and equilibration. This organ, like the central nervous tube is epiblastic in origin; it arises as a bulb which becomes deeply embedded in adjacent mesoblastic and sinks into close association, but without communicating, with the third cerebral vesicle. The auditory bulb gives origin to the saccule, utricle, cochlea, and three semicircular canals—all hollow structures filled with fluid—endolymph. The whole is known as the labyrinth.

The complex system in some vertebrates—Elasmobranch fishes—retains relations with the exterior by means of the endolymphatic duct (Fig. 7). The fluid in this labyrinth of canals and saccules is affected by vibrations of air and water, and by alterations in the position of the head. The labyrinth is concerned with hearing and with equilibration.

A comparison of the chondrocranium of man with the cranium of a cartilaginous fish is instructive. In such fishes the semicircular canals are big and easily seen in the translucent cartilage. The endolymph in the canals comes into relation with the water in which these fishes live, merely separated from it by skin (Fig. 7); it is easily affected by vibrations in the water and by alteration in the position of the fish. The significance of these facts is obvious: the area of the auditory capsule which lodges the bulb of the ductus endolymphaticus is in close relationship with the orifice of the lateral recess.

For nearly 50 years I have sought for an anatomical relationship between the ventricular cavities of the

FIG. 4.

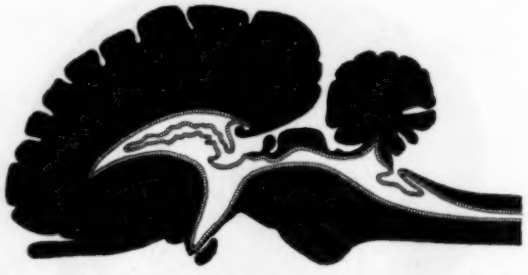
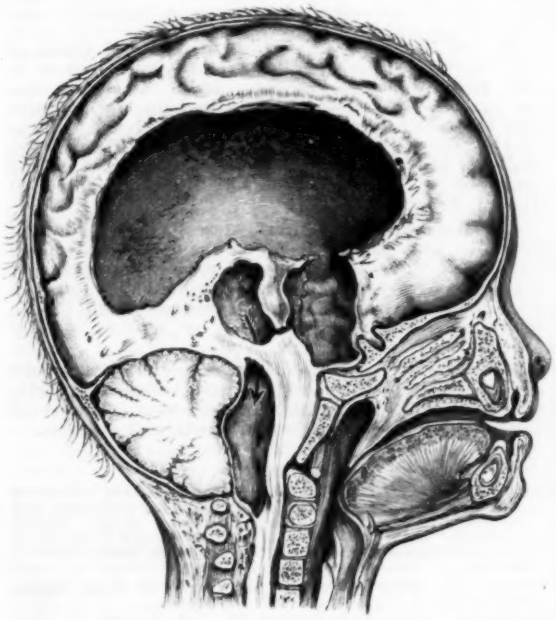


Diagram of a mammalian brain in section showing its ventricles and the choroid plexuses. ("Tumours.")

brain and the ear-labyrinth, believing that the route lay through the lateral recesses of the fourth ventricle. My forecast has been recently demonstrated. Leo Alexander in 1927 studied the lateral recesses in the embryo dog-fish. He discovered that at the spot where the lateral recess comes in contact with the inner wall of the skull-capsule, the cartilage, elsewhere thick, is reduced to a thin connective-tissue membrane which seems as though stretched between two sharp ridges. One side of this membrane is covered with a continuation of the epithelium of the lateral recess; on the other side it is covered with the epithelium of the labyrinth-vesicle. Thus the walls of the endolymphatic cavity and the fourth ventricle are separated only by a thin tense membrane (Fig. 8).

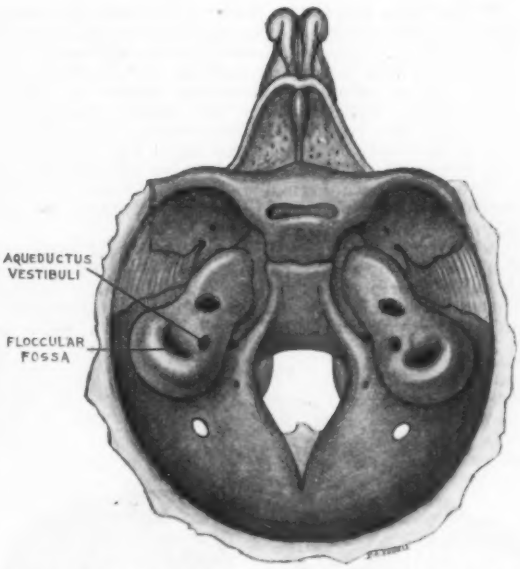
In nearly all vertebrates the internal ear enters into relation with the subarachnoid space through the ductus endolymphaticus. In the mud-fish *Protopterus* the roof of the fourth ventricle is overlaid by the saccus endolymphaticus. Alexander's researches led him to this expression: "Der recessus lateralis ist ein phylogenetisch altes Organ." With this I agree.

FIG. 5.



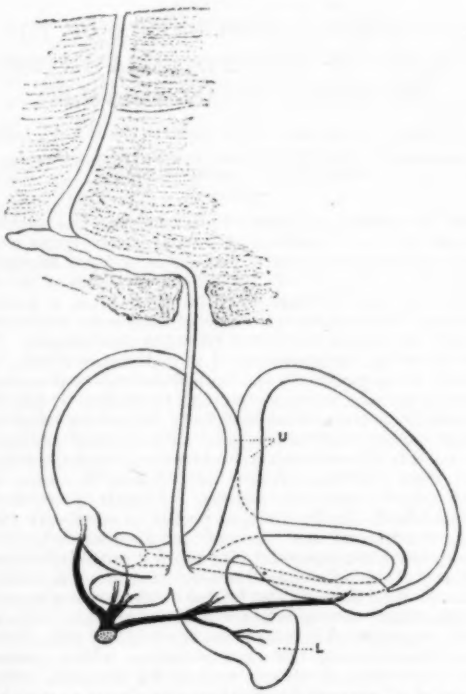
Sagittal section of a child's head the subject of hydrocephalus. The point of the arrow is in the fourth, the nock and feathers in the third ventricle. The infundibulum is widely dilated and the pituitary fossa expanded. ("Tumours.")

FIG. 6.



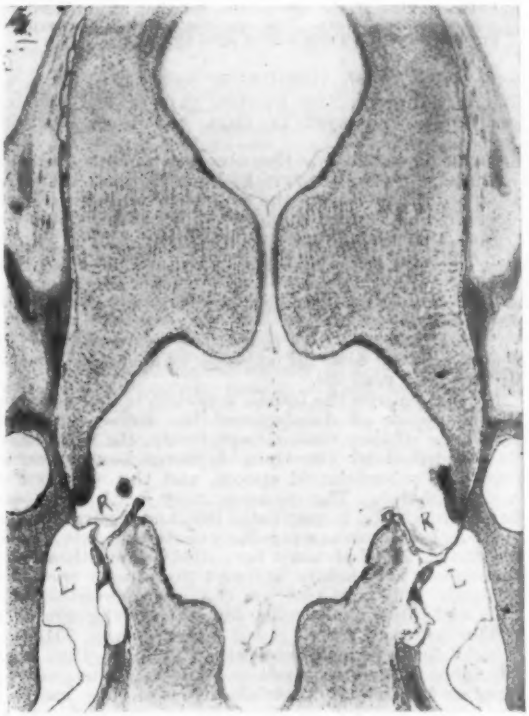
Human chondrocranium × 4, third month. The periotic cartilage is easily identified; also the auditory meatus; and the floccular fossa; and the aqueductus vestibuli. In adult skulls this orifice is overhung by a thin lip of bone which indicates the grave of the endolymphatic sac.

FIG. 7.



Labyrinth of the porbeagle shark. U. Portion of the utricle. L. Lagena. (Cat. Mus. Roy. Coll. of Surgeons.)

FIG. 8.



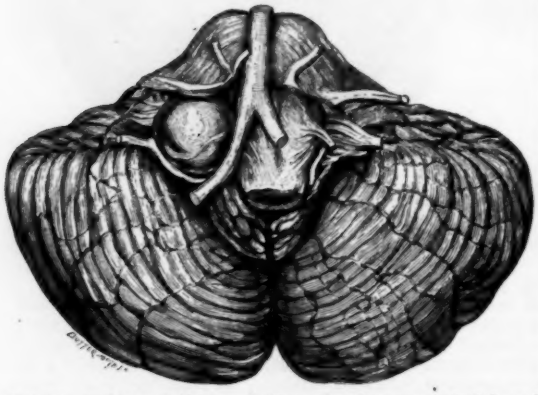
Section of the brain of a dog-fish embryo showing the lateral recess R, and the labyrinth L, in intimate contact. (L. Alexander.)

PATHOLOGY: THE RELATION OF THE LATERAL RECESSES TO HYDROCEPHALUS.

It has been known for many years that the orifice of a lateral recess may be occluded and the fluid within the fourth ventricle will distend it into a globular sac. I observed and described such a cyst in 1886 and found other examples recorded, some of which were called "hydroceles of the fourth ventricles." Alexander has carefully studied them in the Neurological Institute, Vienna, and finds them frequent. In a fair proportion of cases they are associated with definite local pathological signs, connected with the auditory nerve which may be involved in the cyst-wall (Fig. 9).

A study of the embryology of the brain makes it clear that the lateral recesses may be occluded, or remain imperforate in fœtal life. This is of serious consequence to the fœtus, for the cerebellum remains rudimentary or may fail to develop. In such an

FIG. 9.



Inferior surface of the cerebellum showing an occluded and dilated lateral recess. The opposite recess is also occluded but not dilated. From a man aged 29.

event the fourth ventricle is represented as a sac bulging through the median gap of the squamo-occipital. The cyst is then called an occipital meningocele.

In such conditions the observer reports the cerebellum as rudimentary. Cleland in 1883 described it in a different way: the supposed cerebellum is the flocculus. I believe this. The flocculus is developed from the foremost part of the third primary vesicle. An occipital meningocele may be defined as hydrocephalus limited to the fourth ventricle.

The main thesis of this lecture can be shortly expressed:—

Many examples of congenital hydrocephalus are due to prenatal bilateral occlusion of the lateral recesses of the fourth ventricle.

In the embryo the fourth ventricle is a closed sac; in the course of development the recesses arise as pouches. If they remain imperforate, the ventricular fluid secreted by the choroid plexus has no outlet into the subarachnoid spaces, and the sequence is hydrocephalus. The recesses may be formed and become occluded in postnatal life, and hydrocephalus ensue. It follows as a corollary that otologists, keenly interested in what may be called labyrinthine disturbances, will boldly attempt to relieve them by exposure and puncture of the endolymphatic sac. This will afford opportunity for noticing the condition of the orifice of the adjacent lateral recess. Here is a field for surgical enterprise! This lecture may stimulate surgeons to relieve hydrocephalus, not by tapping the lateral ventricles through the vault of the skull, but by incising the lateral recesses at its base!

Apart from surgical enterprise, this investigation adds another vestige in man's complex body to the list of phylogenetic organs which lead to pathological changes of vital importance.

HISTORICAL.

A cyst involving the orifice of a lateral recess of the fourth ventricle was described by Virchow in *Die Krankhaften Geschwülste*, 1863. The cyst was as big as a ripe cherry; it pressed on the flocculus and the facial nerve; remnants of the choroid plexus of the fourth projected into the cyst. Though the walls of the cyst were thin its pressure had caused paralysis of the facial nerve. Virchow named it Hydrocele ventriculi.

Recklinghausen in 1864 described a bilateral example, but no one seems to have associated the condition with the "lateral recesses" until my observations were published in *Brain*, 1887. Luschka gets credit for discovering the orifices of the lateral recesses, and they are called by writers to-day Luschka's foramina.

My views on the foramen of Magendie are briefly set out in my book, "Orations and Addresses," 1924, p. 135. The French physiologist was ignorant of the existence of the orifices of the lateral recesses.

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A CRITICAL INVESTIGATION OF THE VALUE OF IMMUNE SERA IN THE PROPHYLAXIS OF MEASLES.

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OF the many problems which confront the administration of fever hospitals and other institutions where many children are treated, there is none more harassing than the outbreak of an infectious disease in the wards. It not infrequently happens that a patient admitted to hospital with one disease may contract a second, or even a third, before being discharged. Not only does the concurrence of two diseases render the patient more prone to the complications and sequelæ peculiar to each disease, but the necessity of putting the wards in quarantine seriously interferes with the output of the institution, and entails great economic loss both to the individual and to the hospital authorities. The infectious fevers most likely to occur are those which tend to assume epidemic proportions and in which the incubation period is relatively long. Both conditions are present in measles, which, in consequence, is responsible for more "cross-infection" than any other infectious disease. Moreover, according to MacNalty,[1] there is statistical evidence that measles is particularly severe when it attacks children who are closely aggregated in hospitals, the fatality being much above the average. Prompt isolation, which controls most outbreaks, is almost useless for measles. Thus, if a ward of susceptible patients has been exposed to infection by an early case of measles, even for a few hours, further cases follow in due course almost invariably. Zingher[2] states that 96 to 98 per cent.

of susceptibles develop the disease if exposed to it. Attempts to arrest the spread of infection have been made by various means,[3] notably by the free application of disinfectants to throat and nose and to the fomites, but with no appreciable measure of success.

Brief Review of Previous Work.

The first suggestion towards a rational approach to the subject came from the laboratory work of Anderson and Goldberger.[4] In their attempts to transmit measles to monkeys they found that once a monkey was successfully infected by inoculation it could not be reinfected, presumably on account of the production of antibodies in the blood. This led Nicolle and Conseil (1918) [5] to try the effect of the serum of children convalescent from measles in preventing the disease in exposed susceptibles; they found that complete protection was almost invariably conferred, subject to certain provisions as to age of patient, dosage, and period of incubation. Since that date numerous observers in America and on the continent have recorded their experiences with the method; different workers have obtained widely varying results, but of a total of 3500 published cases over 97 per cent. were successfully protected. The immunity is merely temporary and is said to last from one to three months. Probably it does not last so long, for towards the end of an epidemic, when injected cases should have already lost their immunity, the virus of measles may perhaps diminish in infectivity and be unable to attack even moderately susceptible subjects.

In this country in the last few years several workers have successfully immunised susceptible contacts, but the literature on the subject is very meagre. Copeman,[6] working in Paris, indicated in 1925 the possibilities of the method and laid down certain rules for time of administration and dosage. Miller and Smith [7] in 1927 gave a brief account of ten cases so treated; five of the ten failed to develop the disease, while in the remaining five the course was distinctly modified. Kingsbury [8] (1927) described the prophylactic measures adopted among natives on Malayan rubber estates and found that 7 per cent. subsequently developed the disease, but in a greatly modified form. More recently McClean,[9] in a note on three cases, was dissatisfied with his results; his failures were probably due to the fact that the batches of serum used were not pooled.

Valuable as the method is, there must necessarily be great limitations to its widespread employment, chiefly on account of the difficulty of procuring an adequate supply of serum. For this reason the attention of numerous workers all over the world has been focused upon the task of isolating the causal agent, especially with a view to preparing an effective immune serum on a large scale. In the course of a comprehensive review of the recent work McCartney [10] endeavoured to assess the merits of the various claims put forward by workers in America and on the continent. He examined these claims chiefly from the viewpoint of the laboratory worker, and concluded that Ferry and Fisher, Tunnicliff, and Caronia fail to bring forward sufficient evidence that the organisms they describe have any specific rôle in the ætiology of measles. He was equally sceptical of the value of Degkwitz's sheep serum either as a prophylactic or a therapeutic measure.

In the present investigation clinical trial has been made of four well-known immune measles sera. To fulfil the claims of the respective sponsors these sera should give protection from measles if injected in adequate doses within four or five days of exposure to infection, or, if given later in the incubation period, should at least produce some attenuation of the disease. The sera tested were: (1) Tunnicliff's "measles antitoxin" (horse serum); (2) Ferry and Fisher's "measles antitoxin" (horse serum); (3) Degkwitz's "immune measles serum" (sheep serum); (4) convalescent measles serum (human serum).

Concentrated Measles Antitoxin (Tunnicliff).

Dr. R. A. O'Brien kindly supplied samples of serum prepared by the Wellcome Physiological Research Laboratories. This serum was obtained from a horse inoculated for several months with increasing doses of the culture filtrate of Tunnicliff's green-producing diplococcus, and was concentrated and refined according to the methods employed in preparing scarlet fever antitoxin. Dr. O'Brien could give no definite information whether or not the serum contained any antibody, and pointed out that such information must depend entirely upon the results of carefully controlled clinical tests. The American literature on the results of the prophylactic use of serum prepared from Tunnicliff's coccus is already extensive, but can hardly be called convincing. The latest contribution is from Halpern [11] (April, 1928), who claims to have successfully protected 63 per cent. of susceptible contacts by the injection of Tunnicliff's immune goat serum. Moreover, the majority of those who received the serum and developed the disease appeared to have had it in an attenuated form without complications. In this country the only record of the employment of the serum comes from McClean, quoted above. He injected nine susceptible children on the fourth day after exposure to measles and three subsequently contracted the disease, apparently in an unmodified form.

Brief details are here given of the sequence of events in three wards where this serum was employed in the prophylaxis of measles.

Q. Ward (Diphtheria).—Eight children (ages varying from 6 months to 4½ years) who gave no previous history of measles had been exposed to infection for 12 hours. On the third day after exposure they were injected with 5 c.cm. of Tunnicliff serum (Wellcome). As a control serum was withheld from one child, aged 5½ years, who likewise gave no previous history of the disease. As it happened this was the only patient who contracted the disease. While this experience could not be held to prove anything, it encouraged a further trial of the serum. It would have been preferable to have had an equal number of exposed susceptibles as controls, but as protection was anticipated, in view of American reports of the efficacy of the serum, it was considered unjustifiable to withhold it from children under 5 years of age.

G.1 Ward (Scarlet Fever).—Seven children (aged from 2 to 8 years), giving a negative measles history, were injected on the second day after exposure to the disease. The dosage adopted was 5 c.cm. of the serum to children under 5 years of age and 10 c.cm. to those over 5; all injections were given intramuscularly into the outer side of the leg. In three patients so injected measles of moderate severity followed on the tenth to the fourteenth day after exposure to infection; in two more cases the disease appeared on the twenty-first and thirty-second day respectively. It is possible that in those two instances the incubation period was prolonged by the action of the serum but, inasmuch as those patients were subsequently re-exposed to infection on the tenth and the twentieth day after the injection and the disease did not appear to be appreciably modified, it seems probable that the serum had no effect whatever. It was ascertained later that one injected patient had had measles previously, leaving only one injected susceptible who did not develop the disease. The course of events in another exposed ward, in which the average age was about the same and where no seroprophylactic measures were adopted, may be quoted as a control. Of a total of ten susceptibles in this ward eight subsequently contracted the disease, one developing bronchopneumonia.

P. Ward (Diphtheria).—Seven patients (aged 1½ to 3 years), all with a negative history, received 5 c.cm. of Tunnicliff serum on the fourth day after exposure to measles. One child aged 6, who likewise gave a no-measles history, did not receive serum. All eight patients contracted the disease at periods ranging from the seventh to the nineteenth day after the injection; in every case the attack was mild, the only complication being otitis media in a child of 1½ years. In addition one child of 4 years who gave a definite previous history of measles and did not receive serum, contracted the disease in a typical form.

The results of the use of Tunnicliff serum in 21 patients are given in Table I.

Among the 13 patients composing the control group 11, or 84·6 per cent., contracted the disease,

against 57·1 per cent. in the injected group. The difference—i.e., 27·5 per cent.—represents the actual proportion that were apparently protected. The writer had an impression, which is difficult to express by statistics, of mildness of attack in the injected group, but which suggested the use of larger doses in future.

TABLE I.

Day of exposure.	Susceptibles injected.	Number and percentage developing measles.	Percentage apparently protected.	Number and percentage developing serum reaction.
2	6	5 (83·3)	16·7	1 (16·6)
3	8	0	100	0
4	7	7 (100)	0	2 (28·6)
Total ..	21	12 (57·1)	42·9	3 (14·28)

Serum Reactions.—Although 17 of the 22 patients had had horse serum before there were no serious serum reactions. In nearly all an immediate or accelerated rash appeared at the site of injection, but in most cases it remained localised and caused no constitutional symptoms. In three patients reactions were fairly pronounced; pyrexia, malaise, arthritis, and rashes of urticarial and morbilliform type were present, but no untoward effects ensued.

Conclusion.—While all the injected cases who developed measles exhibited the disease in a fairly mild form, with few complications and no deaths, there is no certain evidence to show that the type or course of the disease was modified in any given case by the use of Tunnicliff serum.

Concentrated Measles Antitoxin (Ferry and Fisher).

Measles antitoxin prepared by Drs. Ferry and Fisher [12] of Detroit was supplied by Dr. J. Stanley White, of Messrs. Parke, Davis and Co. This serum was prepared from horses immunised by increasing doses of the culture filtrate of Ferry and Fisher's organism (the so-called "*Streptococcus morbilli*") and was concentrated by accepted methods. The serum was issued for experimental purposes only, as its antitoxic potency had not yet been determined.

R.1 Ward (Diphtheria).—Twelve presumably susceptible children (ages ranging from 8 months to 3½ years) had been exposed to measles for 18 hours. On the fourth day after exposure they were each injected intramuscularly with 5 c.cm. of measles antitoxin (Ferry and Fisher). One infant aged 3 months and four children who gave a previous history of measles were not inoculated. All 12 injected cases developed measles of moderate to marked severity on the eleventh to the fourteenth day after exposure to infection; two cases developed purulent otitis media, but serious pulmonary complications were absent. One patient who gave a previous history of measles had an attack of similar severity to that of the injected group on the twelfth day after exposure.

The findings are given in Table II.

TABLE II.

Day of exposure.	Susceptibles injected.	Number and percentage developing measles.	Percentage apparently protected.	Number and percentage developing serum reaction.
4	12	12 (100)	0	4 (33·3)

Serum Reactions.—In four patients serum reactions of moderate to marked severity were observed, characterised by pyrexia (102°–103° F.), malaise, adenitis, and arthritis, with various types of rashes, but no ill-effects followed.

Conclusion.—Ferry and Fisher's anti-measles serum gave no indication of power to confer immunity from the disease or to modify its course in any way. One-third of the patients showed marked serum reactions, which inconvenienced them considerably but did not appear to have any untoward effect on the course of the disease.

Degkwitz's Immune Sheep Serum.

This serum was made available for clinical trial through the kindness of Dr. Charles Todd, who received supplies from Dr. R. Degkwitz, of Munich. Exact details of its manufacture are not given, but "it appears that sheep are repeatedly inoculated with filtrates of nasopharyngeal secretions from measles patients and with tissue cultures inoculated with measles virus" (McCartney [10]). Widely varying reports, on the whole disappointing, of the value of the serum in measles prophylaxis have already been published on the continent, but it does not appear to have been used on any scale in this country.

Ten susceptible children who had been exposed to measles were injected intramuscularly with 5 c.cm. of Degkwitz's serum; all were under 5 years of age. Of these six were patients at the North-Eastern Hospital under the care of Dr. J. C. Blake, to whom I am indebted for the clinical details, while the remaining four were injected at the Park Hospital. All Dr. Blake's cases were injected on the fifth day after exposure, which is the optimum time given by Degkwitz for serum treatment. The intervals between exposure and time of injection, with the results of the administration of the serum, are briefly given in Table III.

TABLE III.

Day of exposure.	Susceptibles injected.	Number and percentage developing measles.	Percentage apparently protected.	Number and percentage developing serum reaction.
2	4	1 (25)	75	1 (25)
5	6	5 (83·3)	26·7	1
Total ..	10	6 (60)	40	1 (10)

The patients who developed measles exhibited the disease in a typical form, apparently without attenuation. A serum reaction was noted in one patient only—slight pyrexia with transient generalised urticaria. In certain patients in whom measles supervened at the time when serum disease usually develops it was difficult to exclude the possible concurrence of the two diseases.

Conclusion.—Degkwitz's serum does not appear to contain any antibody; if any is present it is insufficient to prevent the onset of measles.

Convalescent Measles Serum.

In a large city like London, where opportunities for infection during childhood are so frequent, it is comparatively rare to see an adult suffering from measles; consequently it is somewhat difficult to obtain adequate and regular supplies of convalescent measles serum. The average age of measles patients admitted to one of the Metropolitan Asylums Boards' institutions during the recent epidemic was two and three-quarter years, while admissions over the age of 7 years numbered less than 2 per cent. Even when a suitable adult convalescent is available it is not always possible to obtain the necessary consent to procure blood except to protect members of his own family.

Technique.—In the present series 21 donors were used; all were under the age of 10 years and the majority were under 6. Amounts of blood varying from 20 to 60 c.cm. were withdrawn from each convalescent donor from one of the ante-cubital veins, at an interval of 10–14 days after defervescence. All the cases selected were of moderate severity and ran an uncomplicated course. Care was taken that the subjects were vigorous, free from tuberculous or syphilitic taint, and not incubating, as far as was known, any infectious disease. The blood was drawn into agar-lined test-tubes of 50 c.cm. capacity and placed in the incubator for one hour, when the supernatant serum was pipetted off. The remainder was centrifuged for 20 minutes and added to the rest; in most cases the blood yielded one half or more of its volume of serum. The Wassermann reaction was performed on each batch, tests for sterility were carried out, and three or more samples were pooled and put up in sealed glass ampoules, each containing 3 c.cm., 4 c.cm., and 5 c.cm. of serum respectively. No disinfectant or preservative was

added to the serum. The finished product was stored in the cold room at 4° C. until required. Of the 21 samples one gave a positive Wassermann reaction and was discarded. The donor in question showed no clinical evidence of syphilitic infection and appeared healthy in every way.

In every instance the serum was employed with the express purpose of affording protection, in order to control outbreaks of measles and avoid putting the cross-infected wards in quarantine. The dosage adopted was: 3 c.cm. for children under 1 year, 4 c.cm. for those between 1 and 5 years, and 5 c.cm. for those over that age if injected on or before the sixth day after exposure, but relatively larger doses were given if the injection was made after the sixth day. All the injections were given intramuscularly.

The serum was employed in five wards in which outbreaks of measles had occurred.

D.1 Ward (Scarlet Fever).—Twelve patients in a ward of 22 gave a negative history of measles; the ages ranged between 1½ and 6½ years. Convalescent measles serum was not immediately available, but on the sixth day after exposure five susceptibles were injected with 4 c.cm. of pooled serum. None of the five developed the disease. The remaining seven patients were injected on the eighth day after exposure, each receiving 5 c.cm. of serum. One of these, aged 5½ years, had slight fever and mild catarrhal symptoms on the fourteenth day after exposure; next day Koplik's spots were observed and were visible for the three following days. On the fifth day after the onset a faint rash appeared behind the ears, while on the sixth traces of rash were seen on the trunk for a few hours. The temperature never rose above 100° F. and the constitutional disturbance was trivial. Another of the seven, aged 4 years, showed mild fever and Koplik's spots for three days, when a similar limited and transient rash appeared, leaving no staining. Two patients, aged 3½ and 5 years respectively, who gave a history of previous measles and were consequently not injected, contracted the disease in a typical form on the twelfth day after exposure, one of them developing pneumonia.

All fresh scarlatinal patients admitted to the ward who gave a negative history of measles were immediately given an injection of serum according to the scale mentioned previously; as a result the ward was free from measles for 22 days. On the twenty-third day, however, a child, aged 4½ years, who had received 4 c.cm. of serum on admission, showed a rubella-like rash which lasted only for 24 hours; pyrexia, malaise, catarrhal symptoms, and Koplik's spots were all absent. Next day a patient aged 5 years, who was similarly injected, showed a condition practically identical in rash distribution without the characteristic features of measles. The diagnosis rested between abortive measles and rubella, with the probability in favour of the former. This was confirmed 12 days later when a patient, aged 4 years, with a history of previous measles developed the disease in a typical form, having been infected presumably by either of these two abortive cases. After this experience it was decided to inject all fresh arrivals under 5 years of age, irrespective of their history. No further cases of measles appeared in this ward. No information was available from these cases on the duration of the protection. One patient, to whom the disease would probably have proved fatal at the time, was reinjected six weeks after the first injection as a precaution against possible loss of immunity.

D. Ward (Scarlet Fever).—Twelve patients who gave no previous history of measles, and four under 5 years of age who gave a positive history, were injected two days after exposure to the disease. Despite the outbreak fresh patients were admitted to the ward, even although they had no previous history of measles. No secondary case of the disease occurred, so further injections were unnecessary.

O. Ward (Diphtheria).—No convalescent measles serum was available when an outbreak occurred in this ward, and as a result seven out of ten susceptibles contracted the disease. When a supply of serum was forthcoming fresh cases were admitted, each receiving the appropriate dose for the age. Four patients were injected; one of these, aged 3½ years, developed a discrete macular rash on the fifteenth day after exposure to measles; pyrexia, malaise, and catarrh were absent, but doubtful Koplik's spots were noted for a few hours. The case was regarded as a modified or abortive form of measles. The serum used for these four injections was monovalent, so lack of antibody production in the donor may have been responsible for its failure. It is interesting to note that the donor had received a "prophylactic" dose of Tunnicliff's serum four weeks previously, but had contracted the disease in due course without apparent modification.

P.1 Ward (Diphtheria.)—Six susceptible children were injected, according to the dosage detailed above, on the second day after exposure; no further cases of measles occurred.

H.1 Ward (Scarlet Fever).—Nine children giving a negative measles history, and two under 5 years of age who gave a positive history, were inoculated on the third day after exposure to measles; none of the injected group contracted the disease, but one control patient developed it on the eleventh day after exposure.

Serum Reactions.—No serum reaction, local or general, followed the administration of the human serum.

The results of 74 injections of convalescent measles serum are presented in Table IV.

TABLE IV.

Day of exposure.	Number of susceptibles injected.	Number and percentage developing measles.	Percentage apparently protected.
1	35	3 (8·57)	91·43
2	18	0	100
3	9	0	100
6	7	0	100
8	5	2 (40)	60
Totals ..	74	5 (6·75)	93·25

Conclusion.—Convalescent measles serum is a safe and reliable agent both in the prevention and the attenuation of measles. The results of the first day injections would appear to be less satisfactory than those of the second to sixth days after exposure to the disease. The three cases of measles occurring after administration of serum on the first day were so mild that there was considerable difficulty in deciding the diagnosis; none of the typical features of the disease was present, and the only manifestation was a rash which resembled rubella rather than roseola. One of the failures may reasonably be ascribed to the fact that the serum employed was obtained from one donor; the other two may possibly have been due to subprotective dosage (4 c.cm. for children of 4½ and 5 years of age respectively). The two patients who contracted the disease after injection on the eighth day after exposure presented all the usual features of the disease but in a mild form, and suggested the possible therapeutic value of the serum.

The results of the prophylactic administration of the four sera are briefly summarised in Table V. For purposes of strict comparison only injections given before or on the sixth day after exposure are included; the five injections of convalescent serum given on the eighth day are therefore omitted.

TABLE V.

Serum injected.	No. of susceptibles injected.	Percentage.		
		Developing measles.	Apparently protected.	Serum reactions.
Tunnicliff ..	21	57·1	42·9	14·28
Ferry and Fisher's	12	100	0	33·3
Degkwitz's ..	10	60	40	10
Convalescent serum	69	4·3	95·7	0

The entire control group consisted of 23 patients who gave a negative history of measles; of these 18, or 78·3 per cent., subsequently developed the disease. In other words, in 21·7 per cent. of the control cases the negative history was inaccurate, the patients were naturally immune, or they were fortunate enough to escape infection from the primary cases. Due allowance for this proportion must be made when examining a series of "protected" cases after the administration of any prophylactic serum, animal or convalescent.

A review of the foregoing tables clearly shows that, until we have an animal serum more efficient than those used in the present investigation, convalescent serum must remain the only certain method of controlling

the disease. The results of its employment justify a wider recognition of its value, and its application in public health administration generally.

I wish to acknowledge my gratitude to Dr. J. E. McCartney, director of Research and Pathological Services, Metropolitan Asylums Board, through whom the animal sera were obtained, and under whose direction the convalescent measles serum was prepared at the Southern Group Laboratory; and to Dr. T. H. Woodfield, medical superintendent of the Park Hospital, by whose courtesy and kindness this work was carried out.

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THE ACTION OF OXYTOCIN AND VASOPRESSIN ON THE UTERUS IN LABOUR.

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RECENTLY Kamm, Aldrich, Grote, Rowe, and Bugbee [1] have described the separation of two extracts of the posterior lobe of the pituitary body, the one having the oxytocic property (the power to stimulate the musculature of the uterus) and the other having the pressor property. The first has been prepared by Parke, Davis and Co., under the name of oxytocin, and the second under the name of vasopressin. In this country, Gaddum [2] has confirmed the claim that oxytocin has only a trace of pressor activity, and that vasopressin has only a trace of oxytocic activity. Through the kindness of Messrs. Parke, Davis and Co., samples of these two extracts have been placed at our disposal for the determination of their action on the human uterus in labour.

Method.

Our method has been the one which we have already described,[3] in which a small rubber bag, shaped like a disc and attached to the end of a gum elastic catheter, has been inserted in the uterus in order to record the changes of intra-uterine pressure. The end of the catheter outside the vagina is attached by way of a thick rubber tube to a mercury manometer, so that changes of pressure on the bag in the uterus are transmitted along the fluid, with which the bag and tube are filled, to the manometer, and a record of the changes is obtained on a slowly moving drum. The bag is inserted into the uterus as a sterile object with full aseptic precautions when the patient is anæsthetised. A time is chosen when the os is sufficiently dilated (admits two fingers) to make the insertion a simple matter, and the bag is pushed up into the uterus outside the membranes until it is past the fœtal head. As we have explained, this procedure involves the application of no force and does not interfere with the normal course of labour.

Action of Oxytocin.

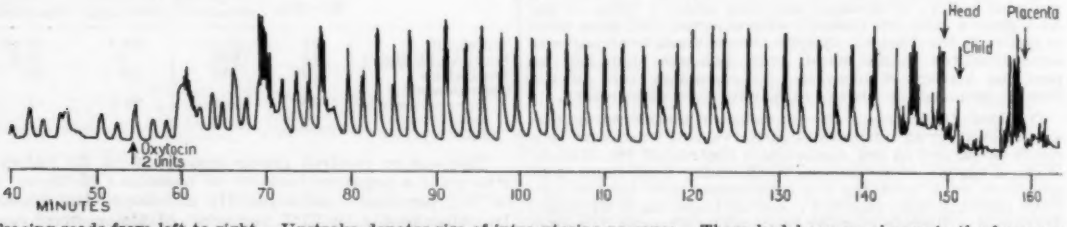
It is to be remembered that, in separating oxytocin and vasopressin, Kamm and Aldrich and their co-workers were using as a guide to the oxytocic principle the action on the isolated uterus of the guinea-pig. It has always been possible that pituitary principle which stimulated the parturient human uterus was not the one which stimulates the non-pregnant guinea-pig uterus; at one stage, indeed, of our previous work [3] the evidence seemed to favour this view. However, the direct test of oxytocin on the human uterus at once dispelled all doubt. Whereas oxytocin has a powerful stimulant action, vasopressin, even in large dose, has little effect of any kind on the uterus in labour.

Fig. 1 shows the striking increase of uterine activity following the injection of 2 units of oxytocin. The patient was a primipara who had been in labour for 16 hours when the bag was introduced into the uterus. The os was dilated to a diameter of 2 in. The uterine contractions were recorded for 55 minutes before any injection was made, and during this time there was no obvious change in their frequency or force. The last 25 minutes of this period is shown on the left-hand side of Fig. 1. Two units of oxytocin were then injected into the buttock. A striking augmentation of the pains occurred in 5 minutes, and in 25 minutes the pains assumed the character which we have learnt to associate with the second stage. As the record shows, the child was born 95 minutes after the injection and the placenta 10 minutes later.

Action of Vasopressin.

Fig. 2 A shows that vasopressin, even in large dose, has no stimulant effect. The patient was again a primipara who had been in labour 15 hours when the bag was introduced; at this time the os was dilated to a diameter of 1 in. After 40 minutes, in which a record was obtained, 12·5 units of vasopressin, a relatively large dose, were injected into the buttock. The tracing shows (Fig. 2 B) that there was no augmentation in the force or frequency of the contractions, but from 15 to 25 minutes afterwards the relaxation following the contractions was very slow. It was conceivable that the vasopressin had produced a spasm of the vessels leading to the uterus, so that the return of blood to the relaxing uterus was

FIG. 1.



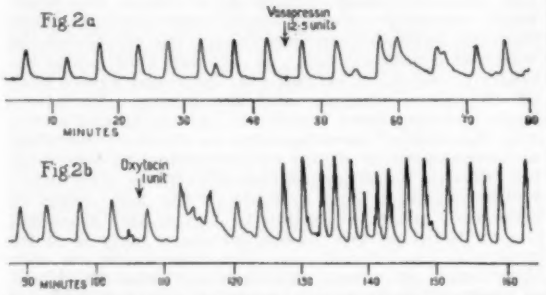
Tracing reads from left to right. Upstroke denotes rise of intra-uterine pressure. There had been no change in the frequency and force of contractions during the 40 minutes before the beginning of the figure. Note large effect of 2 units of oxytocin persisting to delivery. The tracing before the injection represents typical primary inertia.

delayed, and consequently the relaxation itself was delayed. The second portion of the tracing (Fig. 2 B) shows that this injection of a large dose of vasopressin did not interfere with the action of 1 unit of oxytocin injected one hour later. The response to the oxytocin followed at the usual interval and was great enough to carry the dilatation of the os from the half-dilated condition which was observed just before the injection, to full dilatation in about 20 minutes, when second-stage pains were recorded. The observation that the effect of oxytocin is not diminished by the previous injection of a large dose of vasopressin is of interest in relation to the common experience that a second dose of pituitary extract is relatively ineffective. Evidently one injection of oxytocin must render the uterus less susceptible to a second, and the vasopressin element in pituitary extract plays no part in this loss of susceptibility.

Oxytocin Compared with Pituitary Extract.

In our previous work [3] we showed that the response of different patients to the same dose of pituitary extract—namely, 2 units—varied considerably; in some cases the increased activity of the uterus was

FIG. 2.



(*a*) Note absence of stimulating effect on uterus from large dose of vasopressin; (*b*) a good stimulant action from 1 unit of oxytocin in spite of previous injection of vasopressin.

maintained until the birth of the child, so that the injection resulted in a material shortening of labour, whereas in others the effect abated in about one hour. In general, we found that the effect was small and transient if the injection was made too early in labour, but that it was useful and prolonged when given after the os was half dilated. With oxytocin we have found a similar difference in the response in different patients. Fig. 1 is, of course, an example of a big effect, while Fig. 3 is an example of a small one. In this patient the augmentation produced by the injection subsided in 50 minutes.

The Usefulness of Oxytocin.

In spite of the fact that we have found no difference in the action of oxytocin on the uterus from that of pituitary extract, the use of oxytocin has the advantage of precluding the possibility of pituitary shock. Little attention has hitherto been paid to this phenomenon, but it has been recognised for some time among obstetricians, and a striking example was recently described by Lawrence and Shackle.[4] In this instance a dose of 10 units of pituitary extract had been injected into a patient four days after delivery to assist in retraction of a lax uterus. After 10 minutes the patient felt faint, and in 20 minutes she became unconscious and rigid; her breathing became heavy and her colour changed from white to blue. After 30 minutes her systolic blood pressure was found as low as 70 mm. She then recovered.

Although the cases recorded are very few, the occurrence of symptoms resembling these is sufficiently common to have led to a refusal on the part of some obstetricians to use pituitary extract even after delivery of the placenta. To these the use of oxytocin in place of pituitary extract can confidently be recommended, for it is without any of the vasomotor effects which are responsible for the collapse.

Summary.

1. The action of oxytocin and vasopressin, the separated constituents of pituitary extract, has been examined on the human uterus in labour by a method which enables a graphic record of intra-uterine pressure to be taken.

2. Oxytocin possesses the typical stimulant action, whereas vasopressin has no effect, even in large dose.

3. A given dose of oxytocin (2 units) produces a large response in one patient, a small one in another. Our experience with it confirms our previous conclusion about pituitary extract, that a dose of 2 units will, as a rule, produce a useful effect if administered when the os is at least half dilated.

4. Oxytocin may safely be used by those who have refrained from using pituitary extract because of the danger of shock.

FIG. 3.

A small effect produced by 2 units of oxytocin. The effect had completely passed off in 50 minutes.

We should like to express our indebtedness to the matron and sisters of Queen Charlotte's Hospital, from whom we have received valuable coöperation.

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THE ACTION OF THE POST-PITUITARY PRINCIPLES ON THE BLOOD.

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SEVERAL investigations have been made into the action on the blood of extracts of the posterior lobe of the pituitary body. Hypercoagulability was demonstrated by Weil and Boyé,[1] and by La Barre,[2] who found that the substances present in the extract are incapable of provoking blood clotting but accelerate the formation of thrombin and also increase the action of thrombin on fibrinogen. From clinical observations it has been suggested that the leucopenia and blood pressure changes are correlated with the production of hypercoagulability, and are due to direct action on plasma complexes.

The existence of more than one active principle in post-pituitary extracts has been denied by Abel,[3] Geiling,[4] and others, but Dale and Dudley [5] and others maintain that at least three principles, with differing activities, can be separated from the extract. More recently, Messrs. Parke, Davis and Co. have obtained in their laboratories, in a state of comparative purity, two fractions, which they have named respectively vasopressin and oxytocin. The former raises the blood pressure and has little action on the uterus, and the latter has a marked stimulating effect on the uterus with little or no effect on the blood pressure. The object of this paper is to describe the actions of these fractions on the blood as indicated by alterations in its coagulability and the rapidity of sedimentation of blood corpuscles.

Methods.

In this series of experiments cats were employed. The animals were anæsthetised throughout with chloroform, which has very little effect on the coagulation of blood shed at a temperature of 18°-20° C. Blood samples were obtained by means of cannulæ in the femoral arteries. After each withdrawal of blood the cannulæ were thoroughly washed and re-inserted higher up the artery. This prevents contamination of the blood with tissue juices. In some cases, also, samples of blood were obtained by puncture of the heart, but these cannot be regarded as free from tissue juices. The blood was shed into chemically clean glass vessels which were kept at constant temperature throughout the experiment, and were covered with moistened filter papers to prevent evaporation. The first departure from fluidity observable with the naked eye was taken as the beginning of clotting, and clotting was said to be complete when the vessel could be inverted without spilling. For estimating the speed of sedimentation citrated blood was employed.

Individual variations of coagulation times of the blood in animals of the same species are well known. For this reason control experiments were made before every injection was given and the effects produced are expressed as differences of coagulation times before and after the injections.

Abridged Results.

Vasopressin increases the coagulability of the blood both in fasting animals and in those at the height of digestion. This is important, as recent work indicates that there are differences in the condition of the blood according to whether the animal is fasting or digesting a full meal (Czubalski [6]), and this may be manifested in man when transfusion of blood is practised (Brem and collaborators,[7] and Pickering [8]).

Thus, in a fasting cat weighing 2·2 kilos, 0·5 c.cm. of vasopressin injected into a brachial vein decreased the clotting time at 19° C. from 5 mins. to 3 mins., the hypercoagulability lasting to a lesser degree for 25 mins. Subsequent doses decreased the clotting time from 6 mins. to 5 mins.

The effect on an animal during the height of digestion may be illustrated as follows: In a cat weighing 3·2 kilos the intravenous injection of 0·6 c.cm. of vasopressin two or three hours after a full meal decreased the clotting time of the blood at 16·5° C. from 5 mins. to 3 mins. 30 secs.

The action of vasopressin on the coagulation of the blood is due to increased speed in the initial changes of blood clotting, the speed of the later phases not being appreciably affected. The effect is not masked by the presence of serum artificially introduced into the circulation.

In only one experiment was an anomalous result produced. Blood shed from a femoral artery after the injection of 0·6 c.cm. of vasopressin remained fluid at 16·2° C. for 36 mins., the clotting time being increased by 23 mins. This result appears comparable to an anaphylactoid reaction.

The previous intravascular injection of sufficient heparin to inhibit blood coagulation prevents the hypercoagulability produced by vasopressin.

The tendency to thrombosis in a vein isolated between two ligatures after injecting the vasopressin is not increased, and the speed of sedimentation of blood corpuscles is not altered.

After severe hæmorrhage, vasopressin either has no augmenting effect or delays the coagulation of the blood.

In a cat weighing 2·9 kilos subjected to a hæmorrhage of 30–35 c.cm., which reduced the clotting time from 7 mins. to 4 mins., the administration of 0·6 c.cm. of vasopressin increased the clotting time from 4 to 9·5 mins.

Oxytocin, when intravenously injected, increased the clotting time of the blood.

In a cat weighing 2·9 kilos the injection of 0·5 c.cm. increased the clotting time from 4 mins. 20 secs. to 50 mins. The clotting times of blood shed later were increased by 2 min., and still later by 5 mins., the effect persisting for half an hour after the injection. Subsequent doses only slightly altered the coagulability.

The anticoagulant action may be attributed to the suppression of changes in the blood which lead to the inception of clotting, as the later phases of coagulation proceed with normal rapidity.

The injection of oxytocin after hæmorrhage produces increased coagulability.

For example, after a hæmorrhage of 30 c.cm. in a cat weighing 3 kilos, the injection of 0·6 c.cm. of oxytocin decreased the clotting time from 8 mins. to 3·5 mins. and then to 2 mins. 20 secs., the effect being produced in 10 mins. The rapidity of the sedimentation of blood corpuscles was unaffected during the last-mentioned experiment, but is increased when the clotting time is increased.

Oxytocin after hæmorrhage does not show any tendency to produce thrombosis in a vein isolated between two ligatures a minute or two after the injection.

Discussion.

It seems clear that the two fractions of the posterior lobe of the pituitary body act differently on blood plasma—vasopressin augmenting and oxytocin inhibiting coagulation. The conclusion of Dale and others that more than one active principle is obtainable from the posterior lobe is thus supported. It should be noted that the general reaction with vasopressin is identical with that obtained with the ordinary post-pituitary extract (La Barre [2]). It is not, however, suggested that the two fractions normally exist free. In view of our findings it seems probable that they are combined in such a way that either the effect of oxytocin on the blood is inhibited, or vasopressin for some reason neutralises the effect of oxytocin and is enabled to bring about the hypercoagulability which is found when whole posterior lobe extract is used. There is, of course, the possibility that the pressor principle is much more abundant than the oxytocic principle, though the two principles maintain a constant ratio, as it is well known that the posterior pituitary extract may be standardised both on the blood pressure and the uterus. Variations have, however, been found and, in the light of Dixon and Marshall's [9] investigations on pituitary secretion and pregnancy, it would be interesting to determine the effect on blood coagulation of extracts of pituitary bodies obtained from animals in the last stages of pregnancy when, according to Dixon and Marshall, the oxytocic activity of the pituitary body is at its greatest. Significant in this connexion is the observation of Manuel and Moreira [10] that the blood of pregnant women may become hypocoagulable as pregnancy proceeds. As, however, their technique is open to criticism (Pickering [8]), their experiments should be repeated.

The differences of the reactions on blood plasma produced after hæmorrhage appear to be of practical importance. The failure of vasopressin to increase coagulation of the blood after hæmorrhage detracts from its value as a hæmostatic. The ability of oxytocin to convert hypocoagulability into hypercoagulability after hæmorrhage should be of considerable advantage during and after labour, when the contractile action of oxytocin on the uterus is supplemented by more rapid clotting of the blood with hardly any increase of blood pressure.

The conditions that favour thrombosis, particularly the formation of white thrombi, have recently been summarised by one of us (Pickering [8]). In normal subjects the principal factors are (1) venous stasis, (2) increased rate of sedimentation of blood corpuscles, (3) ingress of tissue juices into the blood stream, and probably alterations in the agglutinability of blood platelets, arising from changes in the condition of the blood plasma. It should be noted that neither of the preparations examined produced thrombi when blood was confined in a vein by ligature, and that the rate of sedimentation of corpuscles was not increased; nor was there any evidence of abnormal platelet agglutination.

If the results in man correspond with those in the cat it would seem that these fractions do not predispose to thrombosis.

We are indebted to Messrs. Parke, Davis and Co. for their courtesy in supplying the pituitary fractions used in these experiments.

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A CASE OF
INFECTIVE ENDOCARDITIS DUE TO *STREPTOCOCCUS MUTANS.*

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THE condition to be described is one of congenital subpulmonary stenosis, with interventricular septal defect and patent ductus arteriosus, complicated by infection with *Streptococcus mutans* (Clarke). As so often happens, the site of the developmental error proved a point of lowered resistance to infection, the source of which was most probably dental sepsis.

The patient was the child of a first pregnancy; he presented no developmental anomalies other than those in the heart, and the family history is exceptionally clear. We are indebted to Dr. H. Morley Fletcher for the following note: "I saw this patient for the first time when he was 6½ years old. He was well-grown, rather highly coloured but not cyanosed, and there was no clubbing of the fingers. His general condition was very good, and he was able to play like other boys without becoming dyspnœic. There was a systolic thrill and a very loud rough systolic murmur over the pulmonary area. The murmur was not conducted into the carotids, nor was it heard posteriorly over the course of the aorta. The cardiac dullness was increased to the right of the sternum. The case was regarded as probably an unusual form of that variety of congenital pulmonary stenosis in which the pulmonary conus is narrowed as is the conus arteriosus in what is known as subaortic stenosis. Compensation was almost perfect, and I thought the prognosis good. He grew up to be a finely built young man—a great contrast to those poorly developed sufferers whose pulmonary stenosis is accompanied by cyanosis."

Following Dr. Morley Fletcher's advice, the boy's activities were restrained as little as possible; he passed through preparatory and public schools successfully, and though not allowed to run in races or to play Rugby football, he thoroughly enjoyed what was practically a normal life, being a good swimmer and playing cricket, tennis, and fives. In 1924, after two attacks of tonsillitis, his tonsils and adenoids were removed by Mr. F. J. Cleminson. In 1926 he had two attacks of cardiac pain with rapid pulse and laboured breathing, apparently due to taking indigestible food. Otherwise he had only the usual amount of illness, and in spite of his loud murmur he slept soundly. In 1927, at the age of 18, he was 6 ft. 2 in. in height, weighed 11 st. 8 lb., and his pulse-rate ranged from 52 to 60. His colour was high, and he was slightly blue in very cold weather. There was no bulging or pulsation over the præcordial area or in the scrobiculus. The very loud systolic murmur was best heard at the base, the vigorous thrill best felt at the apex. He had no abnormal dyspnœa even on exertion.

Onset of Disease.—On July 15th, 1927, while taking the examination for the Higher Certificate, he felt unwell and was found to have a temperature of 100° F. The temperature became normal after 48 hours and he was allowed up, but two days later there was again slight fever, which persisted. The Widal reaction was twice negative and there was no evidence of pulmonary tuberculosis. In the first week in August the evening temperature was just over 101° F., pulse-rate 70 to 82, and leucocyte count 11,900, the differential count being without significance. On August 2nd a small streptococcus was obtained by blood culture; this organism was recovered on every occasion (3) during life, and also post mortem from the heart. There were no rigors at any stage of the disease, and no change in the heart murmur was noted.

Possible Source of Infection.—In the absence of tonsils and adenoids, and the antra and nasal sinuses appearing quite healthy, attention was directed to the teeth. These had always been somewhat soft, but had been regularly examined three times a year. In 1923 the patient had suffered from spongy gums, which had been vigorously treated, and since that time he had always taken unusual care of his teeth and gums. Dental radiography on three occasions during the course of the disease failed to demonstrate any source of infection. There was, however, a heavily-stopped lower molar, dark in colour, with some tartar and gingivitis around its socket. On examination after removal, the pulp cavity showed a heavy mixed infection, and it seems probable that this tooth was the original source of the septicæmia. Its extraction on August 19th produced no improvement in the pyrexia. One other heavily-stopped molar, subsequently removed, was found healthy.

Course of the Disease.—During the next two months no new symptom presented itself. In the middle of September, morning and evening temperatures were on a slightly lower level than formerly, possibly as a result of the injection of small doses of autogenous vaccine. On Oct. 14th the chest was X rayed, the heart shadow appearing nearly normal in size and shape. Ten days later there were signs of renal infarction; the temperature rose to 102° and the pulse-rate to 100; the urine became scanty and blood-stained, the average daily amount being 25 oz., sterile on culture, but containing 8 parts of albumin per 1000. On Oct. 31st vomiting began and there were occasional rises of temperature, but after Nov. 14th the temperature became subnormal and did not rise again. The patient maintained his condition remarkably well, but was weakened by frequent vomiting and by epistaxis. On Nov. 29th signs of ascites were present, and on Dec. 2nd a very severe hæmorrhage took place from the nose, and probably also from the intestine. On Dec. 5th an ascending paralysis was observed, which, beginning in the legs, rapidly extended upwards until the patient could move only the muscles of the neck and face. The mental faculties remained normal. He died on Dec. 9th, nearly five months from the onset of the disease; during this time he had grown 5 in. in height, so as to be 6 ft. 7 in. at the time of his death. There was no terminal cyanosis.

Post-mortem Examination.

At autopsy the peritoneal cavity contained free fluid. Both kidneys were very much enlarged and congested, the spleen and liver being similarly but less affected. The kidneys were sterile, but the streptococcus previously found in the blood was recovered in pure culture from the spleen and from the vegetations on the endocardium. The heart's shape was much more nearly square than usual, being 4½ inches in height and breadth and nearly 3 inches thick. By cutting a small window in the wall of the right ventricle, Sir Arthur Keith demonstrated that the principal malformation was due to the imperfect union of the body with the infundibulum (bulbus cordis) of the right ventricle, and that the specimen was a very unusual one in that this union was nearly complete, only a ring of thickened fibrous endocardium remaining at the site of the junction of the body and infundibulum. The pulmonary valves were quite healthy and there was no narrowing of the pulmonary orifice, but the presence of this ring, the ostium bulbi, ½ inch below, oval in shape, and measuring ½ inch by ¼ inch, had produced an hour-glass constriction in the right ventricle, aptly described as subpulmonary stenosis. "It was on this ring," to quote Sir Arthur Keith, "that the vegetations formed and where the real obstruction and friction occurred. There was, as nearly always in such cases, an interventricular foramen at the base of moderate size (¾ inch in diameter), and very great dilatation and hypertrophy of both ventricles, both being equally thick (¾ inch). The aortic stem, which rises immediately above the interventricular foramen, is smaller and thinner-walled than is the pulmonary artery; at least two-thirds of the blood, venous and arterial, left the heart by the pulmonary artery, and I suspect there had been a constriction on the aortic arch. There must have been an open ductus arteriosus, but owing to the limited post-mortem examination granted, that and the aorta were cut away. For the same reason it is impossible to say whether the foramen ovale was patent or not. In such hearts with the increase in dilatation and hypertrophy of the left ventricle, the infundibular opening in the right ventricle becomes more and more compressed, and

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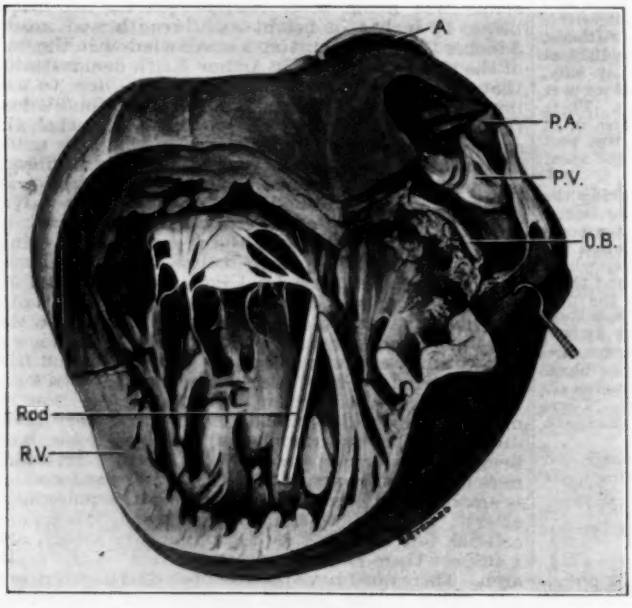
thus the blood as it passes through the obstruction produces friction and a loud systolic substernal bruit, often mistakably assigned to the ductus. Owing to this friction the endocardium becomes frayed and therefore prepared for infection, precisely as in this case, where vegetations had been superimposed upon the fibrous ring. There were none elsewhere."

Bacteriology.

A streptococcus was obtained in pure culture on each of the three occasions on which blood was withdrawn during life and from the endocardial vegetations post mortem. Culture was performed by adding 10 c.cm. of blood (or a fragment of vegetation) to 100 c.cm. of nutrient broth containing 1 per cent. of glucose. The bacterial growth appeared in two to three days in the form of whitish granules on the surface of the sedimented blood; a coarsely granular turbidity in the supernatant broth developed later. Sub-cultured on glucose agar containing 10 per cent. of horse blood, the growth appeared as minute ivory-like domes of pin-head size in 24 hours, reaching a diameter of 1 mm. in two days when sufficiently spaced. These larger colonies later developed knobs, which gave them a cauliflower appearance, and growth occurred in similar fashion in the depths of the medium, so that when dug out whole, the colonies appeared as firm ivory-coloured, mulberry-surfaced spheres. On media free from glucose, even when containing blood, growth was slight, broth showing only a fine sediment and agar colonies barely visible to the unaided eye. There was no hæmolysis in liquid or solid media, and no evidence of peroxide formation, the blood turning to brown or buff without any green discoloration. Fermentation tests showed that the streptococcus produced acid from glucose, lactose, saccharose, raffinose, mannite, and salicin. Microscopically the coccus appeared in liquid media as a minute round cell of rather under 1 μ in diameter arranged in short chains; in glucose broth (in which a copious flocculent growth occurred) the cocci were in very long chains of round cells which rapidly became Gram-negative as contrasted with the strongly Gram-positive staining of those from other media. On glucose agar the majority of the bacterial elements appeared in rod form, the microscopical picture resembling that of a culture of diphtheroid bacilli. But such cultures reverted immediately in glucose-free media to the original streptococcus form. These properties recalled those described by Clarke [1] for the streptococcus which he isolated from carious teeth and named *Streptococcus mutans*. In fact, when a culture of Clarke's streptococcus was obtained (through the kind offices of Dr. L. Colebrook), it was found to give identical appearances on all media. Moreover, an agglutinating serum (obtained also from Dr. Colebrook) gave typical full-titre agglutination (about 1 in 2000) with the streptococcus under investigation. Completing the identification, a serum prepared with the latter agglutinated Clarke's streptococcus, and was robbed of its agglutinin on saturation with it.

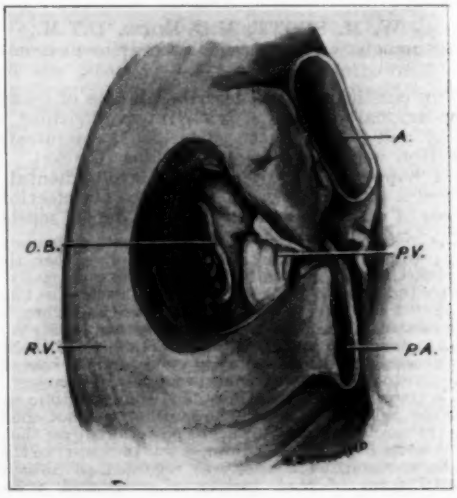
FIG. 1.



Shows the heart with the greater part of the anterior wall of the right ventricle removed, and the cut edge drawn aside to expose the obstruction; the vegetations superimposed upon the fibrous ring are easily seen.

A = Aorta. P.A. = Pulmonary artery. P.V. = Pulmonary valves. O.B. = Ostium bulbi. R.V. = Right ventricle. The rod is passing upwards to enter the interventricular foramen.

FIG. 2.



Shows the condition seen from above, and gives a good idea of the stenosis below the pulmonary valves.

There appears to be no doubt that the fatal infection in the case described was actually one of *S. mutans*.

Dr. Clarke has been good enough to give us details of three other cases of fatal endocarditis in which this streptococcus was the causal agent. Two of these he described in a communication to the Pathological Society of Great Britain and Ireland at its meeting in July, 1924. In all three the coccus was found in the circulating blood during an illness closely resembling in its course that of the case under discussion—i.e., a subacute fever with temperature never rising above 101° F., without localising signs and ending fatally in three to four months. Post-mortem examination of one of the three, a boy of 17, showed endocardial vegetations on the right side of the heart. The other two were men of about 40 years of age on whom no autopsy was made. The serum of one of them tested by Dr. Clarke against his own strain of *S. mutans* and against other strains isolated from carious teeth agglutinated all of these equally in a dilution of 1 in 2000.

There can thus be no question that *S. mutans* (Clarke) is capable, probably under special conditions of heart strain, of attacking the endocardium, producing a subacute inflammation there and consequent death by septicæmia. Clarke's contention that this streptococcus is the chief bacterial cause of dental caries may still be disputed, and further data on the subject ought to be obtained by dental bacteriologists. The few observations which I (W. M. S.) have been able to make on this point tend to support Clarke. Of 12 teeth in various stages of caries which I examined 11 gave more or

less abundant colonies of a streptococcus behaving in identical fashion in culture and serological reactions with the strain isolated from endocarditis. In four of the teeth in which an early stage of infection of the pulp existed, the pulp cavity contained this streptococcus in pure culture; in one it was mixed in almost equal numbers with a *Streptococcus viridans*. It is evident that the carious tooth harbours *S. mutans* in a very high percentage of instances and that, whether or not it is the cause of the caries, it is capable of infecting living tissue.

Comment.

Sir James Mackenzie [2] noted that "a child with an impaired heart is not likely to injure it by overexertion. Children are very sensitive to distress provoked by cardiac insufficiency and will themselves abstain from undue effort without being told; when they exert themselves and find pleasure in doing so, it may be taken for granted that no harm is being done." This boy was under observations for 18 years; during the whole of that time there was neither sign nor symptom to indicate that his disease was progressive. Compensation was as good at 18 as it had been at 6. In spite of the great hypertrophy of the ventricles, there is nothing to suggest that he had even begun to encroach upon the reserve power of his heart. He was not cyanosed, and he never became dyspnœic. It seems absolutely certain that no improvement of his condition could possibly have been obtained by irksome restrictions designed to spare his heart. There are only two things to be done for the subjects of congenital heart disease. The first is to use every effort to protect them from sepsis, and the second is to find out how much they can do, and let them do it.

Two points in this case are of outstanding interest and importance:—

1. The infecting organism, *S. mutans*. This is believed by Clarke to be the cause of dental caries, and was found by him in three cases of subacute infective endocarditis. It will be observed that we cannot claim to have isolated this organism from our patient's mouth, though we think it probable that it was present in the diseased tooth and was overgrown by other organisms on culture.

2. The nature of the cardiac lesion, subpulmonary stenosis. The imperfect union of the infundibulum with the right ventricle was fully described by Sir Arthur Keith [3] in his Hunterian lectures in 1909, and according to him this anomaly is responsible for more than half the cases of congenital heart disease. Dr. Maude Abbott,[4] writing of conus deformities, considers them "probably the commonest of all cardiac anomalies." No one would reach this conclusion from reading text-books, and we submit that the subject would be greatly simplified by reserving the adjective "pulmonary" for the rare cases of stenosis at the valve, which are probably of inflammatory origin, and by applying the adjective "subpulmonary" to the common cases of stenosis in the conus, which are certainly developmental errors.

We wish to acknowledge very gratefully the immense assistance we have received from Sir Arthur Keith in the preparation of this note.

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1. Clarke, J. Kilian: Brit. Jour. Exper. Pathol., 1924, v., 141.
2. Mackenzie, Sir James: Principles of Diagnosis and Treatment in Heart Affections, 2nd edit., p. 55.
3. Keith, Arthur: THE LANCET, 1909, ii., 360.
4. Abbott, Maude E.: Modern Medicine (Osler and McCrae), 3rd edit., iv., 729.

TORBAY HOSPITAL.—The new Torbay Hospital, which has cost nearly £150,000, received its first patients last week, although it has not yet been opened formally. The hospital, which stands in some 14 acres, commands views from almost every window of Torbay on one side and to Dartmoor on the other. It is the gift of Mrs. Rowcroft, of Torquay, a member of the Wills family.

Clinical and Laboratory Notes.

THREE CASES OF DEATHS UNDER ANÆSTHESIA.*

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With Post-mortem Notes by

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THE following cases are unusual and instructive:—

On Feb. 16th a girl, aged 5, was operated upon at the Royal Hospital for Sick Children for an acute abdomen and was given gas and oxygen with local infiltration of novocaine and adrenalin. Nothing abnormal was noted during the anæsthesia, which lasted 30 minutes. The abdominal condition was found to be a pneumococcal peritonitis, and antipneumococcal serum (Type I.) was given daily intravenously in doses ranging from 25 c.cm. on Feb. 17th to 50 c.cm. on the 25th, without any incident.

On March 4th another injection was given and this was immediately followed by temporary collapse, apparently directly due to the serum, of which 40 c.cm. had been given intravenously. As there was no improvement in the general condition of the patient the surgeon decided to do a blood transfusion; this was done in the theatre on March 9th; the father was the donor and 250 c.cm. of blood were taken. The child had been prepared for a general anæsthetic, but it was not anticipated that she would require one. Local infiltration with ¼ per cent. novocaine and adrenalin was done. The vein was exposed just above the right elbow and the cannula introduced.

After about 50 c.cm. of blood had been transfused she became restless and cried out as if in pain. This restlessness increased without any clinical signs of danger to the patient, and the surgeon suggested that I might give her some gas and oxygen. Nitrous oxide 4 parts, oxygen 2 parts was given without any positive pressure. The transfusion continued. The restlessness and moaning ceased, but the pulse increased in rate and became weaker, while the respirations were rapid and shallow and the child was in obvious distress. The nitrous oxide was discontinued and I went on administering oxygen passed over ether, but it became plain that the child—in distress and very ill before starting transfusion—was in extremis. Transfusion was discontinued 20 minutes after the introduction of the cannula, and after 150 c.cm. of blood had been passed. At this stage the respirations were rapid, shallow, and gasping. There was slight cyanosis and the pulse was just perceptible in the carotid artery.

Treatment consisted of: 1. Artificial respiration with oxygen and ether. 2. The administration of 10 minims of pituitrin subcutaneously. The heart-beat and respiration ceased 35 minutes after the commencement of the transfusion. 3. Atropine, gr. 1/100, was injected into the heart muscle. 4. Cardiac massage was done through the abdomen. There was no response to treatment.

My own impression of this case at the time was that we were dealing with an anaphylaxis.

Post-mortem Notes (Prof. Shennan).—1. Generalised peritonitis with pus in the abdomen. 2. Liver and kidneys were congested and showed toxic changes. 3. The spleen was enlarged and showed necrosis. 4. The heart was pale and its cavities dilated, especially the right side. 5. Both lungs were congested and the lower lobes of both were collapsed. 6. There was an excess of watery fluid in the membranes over the surface of the brain and in its tissues.

Conclusions.—1. Death was due to heart failure. 2. The restlessness shown by the child while transfusion was proceeding indicated that interference with the heart's action had already begun before the general anæsthetic was administered. 3. This restlessness was probably due to the inability of the heart to propel the additional amount of fluid transfused. 4. Probably the oxygen rather assisted the heart and prolonged life for a short time. 5. The general anæsthetic probably had nothing to do with the fatal issue.

CASE 2.—A female, aged 57, had been under observation for 48 hours with abdominal pain, which had subsided. Some 12 hours before operation the abdominal pain returned.

* Two of the cases were recorded at a meeting of the Scottish Society of Anæsthetists held in Aberdeen.

On the morning of the day of operation the temperature was 98·6° F., the pulse 84, urine normal, and blood pressure 140/90. There was no clinical evidence of sepsis.

The patient was extremely fat, and the surgeon suggested gas and oxygen with spinal analgesia. A hypodermic injection of morphia, gr. 1/6, and atropine, gr. 1/100, was given, anæsthesia induced with gas and oxygen, the patient turned on the side, and 0·7 c.cm. of light stovaine injected between the second and third lumbar vertebræ. Gas and oxygen with a trace of ether was continued. The operation was commenced ten minutes after the injection of the stovaine. The abdominal muscles were completely relaxed, and it was evident that the spinal injection was acting with unusual rapidity and potency. There was no tilting of the operating table. Twenty minutes after the injection of stovaine the pulse was 100 and the systolic blood pressure had fallen to 90 mm. of mercury. The surgeon had opened the abdomen and had found an acute diverticulitis with pus and general peritonitis. At this stage the patient had respiratory distress and slight cyanosis, apparently due to depression of the respiratory centre in the medulla, for there was no evidence of respiratory spasm or obstruction of the airway. The respirations were slow and shallow while the pulse was rapid and feeble.

The surgeon was requested to cease intra-abdominal manipulation, ½ c.cm. of pituitrin was injected subcutaneously, and oxygen passed over ether was continued. Some improvement followed and the surgeon proceeded to close the abdomen. The respiratory distress recurred, with cyanosis and very feeble pulse. Artificial respiration was done and oxygen given through the nose. Respiration completely failed 30 minutes after the commencement of the operation, and this was immediately followed by failure of the heart. Cardiac massage was done through the abdomen, and artificial respiration continued, but there was no response.

My own impression of the case at the time was that we were dealing with a depression of the vital medullary centres in a very toxic patient.

Post-mortem Notes.—1. There was a considerable amount of purulent material over the intestines, which were much distended. The other organs in the abdomen showed toxic changes and venous congestion. The lungs were extremely congested and the bases showed partial collapse from pressure upwards of the abdominal contents. 2. The heart was dilated in all its chambers, especially on the right side. The walls of all the chambers showed distinct toxic changes and the right ventricle wall was largely replaced by fat. 3. The spinal cord showed extreme congestion of the veins and some œdema. The brain showed some general congestion, and the substance was dropsical.

Conclusions.—1. Death resulted from heart failure. 2. Probably the injection of stovaine along the spinal cord may have had an influence in producing this, by extension of its action up to the higher centres. 3. An important factor in bringing about the heart failure was the marked replacement of the heart muscle by fat and the toxic poisoning resulting from the condition present in the abdomen.

CASE 3.—A female, aged 22, whom I was asked to see by the surgeon with a view to giving an anæsthetic for the removal of a foreign body; this had been located by X rays well down the right main bronchus. I was informed that the right lung was out of action and that there was a history of rheumatic heart disease, probably with fresh involvement from the present illness, but that unless the foreign body, which had been in this position for some weeks, could be removed, the patient must die. She was obviously very ill. Temperature 101° F., pulse-rate 128, respirations 40. Rigors, followed by profuse perspiration, occurred at intervals. Cough was very troublesome, with expectoration of large amounts of purulent material.

It was agreed by the physician, surgeon, and anæsthetist that a general anæsthetic should be given and that the easiest and safest type of anæsthesia in the circumstances was rectal oil ether. The same evening gr. 1/100 of atropine was given subcutaneously, followed by a second dose at 11 o'clock the next morning. At 2 P.M. a morphia suppository, gr. 1/8, was introduced into the anus. At 3 P.M. the patient was taken to the theatre and placed upon the operating-table, slightly on her left side with the legs drawn up. A small-sized œsophageal rubber tube was passed well up into the rectum and 6 oz. of oil and ether in equal parts slowly introduced. At 3.20 P.M. she was drowsy and allowed me to pass a fine rubber tube through the nose. A continuous stream of oxygen was given through the nasal tube. At 3.25 P.M. her colour was good, surgical anæsthesia was approaching, her jaw muscles were slightly relaxed, and her respiration rapid but easy. At 3.30 P.M. she was turned on to her back and her head lowered, in preparation for the surgeon.

Suddenly and without cough or warning the respiration ceased and cyanosis supervened. In anticipation of such a contingency an endotracheal catheter was ready. Without delay it was passed into the trachea and attached to the oxygen cylinder. Oxygen under pressure and artificial respiration were continued and adrenalin injected into the heart muscle without response on the part of the respiration or circulation.

Post-mortem Notes.—On removing the lungs it was found that the right lower lobe was solid from inflammation, and there was evidence of recent hæmorrhagic pleurisy with a collection of 10–12 oz. of brownish fluid. On slitting up the windpipe and bronchi the tip of the instrument came in contact with and dislodged the foreign body in the main left bronchus. It was evident that it had not been in this position for long, because there was no roughness of the surface where it had lain, no congestion, and no inflammatory change of any kind. Furthermore, there was no evidence of obstruction of the intrapulmonary air passages below where it was found, and no inflammation of the lung. On the other hand, on opening up the air passages on the right side, the main bronchus and its branches were seen to be deeply congested, and where the secondary bronchus to the upper lobe passed off from the main bronchus there were two small tears in the wall about an inch below the commencement of the main bronchus of that side. These ulcers showed very marked inflammatory reaction, and below this point the air passages were full of yellow-grey pus. Further, the whole of the lower lobe was solid from pneumonia and much of it was soaked in pus, abscess formation being well established. The upper lobe was partly collapsed and was not consolidated. The heart was about normal in size, but on the left side there was well-marked subacute rheumatic endocarditis of the mitral valve.

Conclusions.—1. The cause of death was sudden mechanical interference with the respiration and heart failure. 2. Deceased suffered from acute suppurative pneumonia, from which recovery was hardly possible in any case. 3. This was a direct consequence of the inhalation of a foreign body into the right bronchus, setting up local ulceration and infecting the lung. 4. During anæsthesia the foreign body had been dislodged from its position in the right bronchus and had passed into that on the left side, causing spasm and obstruction of the passages to the left lung, which alone was available for breathing.

Discussion on the Three Cases.

It is a matter for serious reflection that an error in judgment regarding the patient's condition or in the choice of the anæsthetic, on the part of either the surgeon or the anæsthetist, may lead to disaster.

In the first case either 150 c.cm. of additional fluid to the circulation was more than the heart could contend with under the abnormal circumstances, or else the transfused blood produced an anaphylaxis.

In the second case fatty degeneration of the cardiac muscle and general toxæmia so depleted the patient's resistance that 0·7 c.cm. of stovaine depressed the vital medullary centres beyond recovery. Sepsis is a contra-indication to spinal analgesia.

The third case demonstrates that in dealing with a foreign body in the respiratory tract the patient should be placed on the table in position to suit the surgeon and not moved in any way after the commencement of the induction of anæsthesia.

A CASE OF PNEUMOCOCCAL MENINGITIS, WITH RECOVERY.

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(*With a Note by* Dr. A. G. GIBSON.)

ATTENTION has recently been drawn to the fact that the prognosis of pneumococcal meningitis is less grave than was formerly supposed. In America, Globus and Kasanin [1] and Harkavy [2] have each reported cases of recovery and have collected nine cases from the literature. Further cases are recorded by Gould,[3] Simpson,[4] Cautley.[5] These cases were reported in the following years:—1904, 1 case; 1905, 1; 1910, 1; 1912, 1; 1915, 1; 1916, 1; 1919, 1;

1920, 1; 1925, 2; 1926, 1; 1927, 1; 1928, 2. A further case in 1928 is reported.

Mr. X., a benchman of 26 years, had a shivering attack, felt ill, and went to bed on March 13th, 1928. He got up on the following day, but feeling poorly he soon returned to bed where he remained up to the time of his admission to the Radcliffe Infirmary on March 30th. Dr. E. L. Elliott, of Stokenchurch wrote: "His temperature has fluctuated, frequently being about 103° F.; pulse slow in comparison with temperature; photophobia and drowsiness; Widal negative on March 28th."

The patient stated that he had been suffering from pain across front of head and down the neck, and upper part of the back. The pain came on chiefly at night, at which times also he sweated profusely. He had no recurrence of the shivering attack. Vision had deteriorated since the illness started, and distant objects occasionally appeared double. His legs felt rather stiff, but not particularly weak. He was constipated but had not vomited. Sleep was poor. On the whole he felt better than at the onset of the illness.

The patient was ill; he could answer questions but was in some distress from the discomfort in his head. The temperature was 102·8° F., and the pulse-rate 108. Examination showed some rigidity of the neck muscles. The head could not be bent forward and lateral movement was somewhat limited. He could bend it back fully. There was tenderness on firm pressure over sixth and seventh cervical spines and over those of the lower thoracic vertebræ. The pupils were small and somewhat irregular in outline, and there was slight nystagmus to the right. There was stiffness of the legs, especially the right. Kernig's sign with the right leg was doubtful, with the left it was absent. The abdominal reflex was more marked on the right than the left. No disease was detected in the thorax or abdomen. There was no ear discharge and no tenderness indicative of disease of any of the sinuses.

Note by Dr. Gibson.

The fluid was examined by me in the ordinary course of laboratory routine. There were pus cells in moderate numbers in the deposit which settled in the tube, and careful search revealed a small number of typical pneumococci. Unfortunately no culture was made at the time and a subsequent lumbar puncture, when the patient was convalescent, showed a few pus cells only and no organisms either in the stained slide or in culture. My opinion is that this case, both clinically and from the morphological characters of the organism, is correctly described as one of pneumococcal meningitis, mild in type, in which recovery occurred. It formed one of a series of pneumococcal infections which in the winter of 1927–28 has constituted a small epidemic in the district. The following table shows the number of pneumococcal infections of the serous membranes in the last five years:—

	Pneumococcal—	
	Meningitis.	Peritonitis.
1923	0	3
1924	1	1
1925	1	0
1926	0	2
1927	4	4

The patient was given on the second, third, and fourth days following his admission to hospital 20 c.cm. of Messrs. Allen and Hanbury's mixed pneumococcal serum intramuscularly. The temperature on the second day of admission was 102·8° F. on two occasions. After the first injection the temperature was never above 100° and gradually fell to normal in 16 days. All physical signs of disease had disappeared by April 6th, though occipito-frontal headache continued until April 13th. The patient has now fully recovered.

I am indebted to Dr. Gibson for permission to publish this case.

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1. Globus, J. H., and Kasanin, J. I.: Jour. Amer. Med. Assoc., 1928, xc., 599.
2. Harkavy, J.: Ibid., p. 597.
3. Gould, A. G.: Boston Med. and Surg. Jour., 1919, clxxxi., 713.
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NOTE ON AN OUTBREAK SUGGESTING EPIDEMIC JAUNDICE.

BY W. S. RUSSELL THOMAS, M.B. CAMB.

SEVERAL cases of jaundice among children occurred in my practice in the months of May, June, and July of this year. In view of the fact that one of the cases was fatal, and the whole number taken together suggested a small epidemic, the following description may be of interest:—

In June I was called to see a boy, aged 7, who was reputed to have "yellow jaundice." He was apparently suffering from catarrhal jaundice, his mother telling me that he had been in that condition for about ten days to a fortnight, the attack being ushered in by loss of appetite, feeling of sickness, and constipation, followed a few days later by yellow colouring of the skin and conjunctivæ, with large light motions and dark-coloured urine.

Examination showed a furred tongue, moderately yellow skin and conjunctivæ. The temperature was subnormal, 97·6° F., and the pulse 60, regular, slow and full. The heart and lungs were normal, but the edge of the liver was felt about 1 in. below the right costal margin. The spleen could not be felt. The motions were large, light, and pultaceous, and the urine had the colour usually associated with catarrhal jaundice. There was no albumin in it.

A week later the boy's colour had deepened to a dark nut-brown; his nose had bled two or three times, and his lips were extremely pallid. The temperature was still subnormal, the pulse still slow, full, and regular. The colour of the urine was deeper. The edge of the liver could be felt quite easily, and was 1½ inches below the costal margin. The spleen was not enlarged. There were no other physical signs. Normally not a bright boy, his intelligence now suggested the mentally defective. He was sluggish, inclined to be drowsy, and slow to answer questions, and took very little interest in his surroundings. He did not seem to appreciate fully simple questions which a boy of 7 would be expected to appreciate.

About midnight a few days later I was called to see the child because his parents "could do nothing with him." He was said to have been yelling and screaming in spasms for some hours. I found this to be no exaggeration; he was shouting loudly and incoherently; he threw himself violently about the bed, and frequently made fearful noises. This lasted about five minutes or so, then he flung himself suddenly on to his pillow and appeared to be semi-conscious. The lull was not of long duration, but sufficiently long to allow of examination. After the calm the delirium began as markedly as before, accompanied at times with vomiting. Examination showed bright and widely dilated pupils. The heart was slightly dilated, and the pulse was thin and rapid. The lungs gave no physical signs. The liver, however, which hitherto had been so easily palpable, could now only just be felt below the costal margin. I could feel no enlargement of the spleen.

The delirium continued, off and on, for at least 24 hours, alternating with short periods of restless sleep. The boy then sank into coma, the pulse became irregular, and the heart more dilated. The liver was no longer palpable, and the note for about one to two inches above the right costal margin was tympanitic. This rapid shrinking of the liver was very striking. Death took place within a few hours.

During the course of this case, and for about one month afterwards, six more cases of jaundice in children, both boys and girls, ranging from 4 to 14 years of age, came to my notice. These cases were apparently harmless, lasting about three weeks to one month—i.e., from the earliest symptom until the patients could be said to be quite well. The onset in each was marked by loss of appetite, furred tongue, and constipation, and a few days afterwards the yellow colour set in, ranging from a tinge in one to a bright yellow in others.

I should mention that these children went to the same schools, all lived near one another—two in the same house and within two or three doors of the fatal case. There were, I am informed, two or three other cases within a radius of one and a half miles of the fatal case. No history of improper food or drugs was given, nor had these children any other disease.

All this is, I think, strongly suggestive of epidemic jaundice.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF ORTHOPÆDICS.

THE opening meeting of the session was held on Oct. 2nd, when the new President of the Section, Mr. NAUGHTON DUNN, delivered an address on the

SURGERY OF MUSCLE AND TENDON IN RELATION TO INFANTILE PARALYSIS.

He said that the principles relied upon for the treatment of infantile paralysis were recorded in the text-books on orthopædic surgery, and his reason for devoting an address to the subject was that so many alternative treatments were advised that it could only be helpful to review these in the light of personal experience. He wished specially that the discussion should deal with the part played by muscle in the causation of deformity and restoration of function. During the acute illness any treatment of the muscles other than by rest, with the prevention of postural deformities, was generally recognised as harmful. The spinal column and limbs should be immobilised in the positions which would prevent overstretching of the weakened muscles, and also ensure that the position of the joints was the one most useful to the patient, whatever the final degree of paralysis. During convalescence the control of treatment was more difficult; the weakened muscles were like delicate plants in a greenhouse, which required for their development all the skilled care of the gardener. The degree of ultimate recovery would largely depend on the treatment of the muscles paralysed, and too often massage, electrical treatment, and re-education were practised without it being clearly recognised that the only muscles requiring this attention were the paralysed or weakened ones. Weak muscles must be constantly protected, nurtured, and re-educated, with the avoidance of fatigue, while the healthy muscles were allowed to atrophy as much as possible from disuse. The child must be kept recumbent or supported until the surgeon was satisfied that an erect position of the spinal column could be maintained by muscular power. Patients suffering from weakness of the spinal or gluteal muscles sometimes required six or even 12 months of carefully supervised treatment of the weakened muscles before the upright posture could be allowed.

Splintage seemed to be necessary in all cases of infantile paralysis, and the question arose as to when splints could be dispensed with. Splintage to prevent overstretching of the weaker muscles should be continued until there was evidence that further weakening of the affected muscles would not occur if freedom was allowed. The indication for the relaxation of splintage was the patient's ability to maintain the limb in the position which splintage ensured.

The Correction of Established Deformity.

The orthopædic surgeon, continued the President, usually saw the patient for the first time long after the initial stages were past, and at no stage was more patience and judgment in treatment of infantile paralysis needed, for muscular control of the limb was already deficient, and divided tendons and muscles quickly underwent further shortening and atrophy. Division or elongation of a tendon or muscle for the correction of deformities in infantile paralysis should be resisted unless the surgeon was satisfied on the following points: (1) that correction of deformity would improve function; (2) that division or elongation of tendons was necessary for the correction of deformity; (3) that the power of the shortened muscle or tendon could not be utilised by tendon transplantation at the time of operation. Dealing with the deformities which commonly follow infantile paralysis, he gave the result of his own experience. In a general way, he said, the prominence given in text-books to operative methods gave the feeling that the specialty might become too surgical. The value of modern methods could only be assessed in the light of the possibilities of correcting deformity by gradual splintage. He was himself trained in a school in which gradual correction of deformity gave strikingly successful results. He had learned that nature resented tension and gradually permitted relaxation of structures to which it was constantly applied. His own experience was that operation was seldom necessary for the correction of flexion-contracture of the hip in infantile paralysis.

When marked spinal lordosis was present the method used by Dame Agnes Hunt at the Shropshire Orthopædic Hospital was valuable. The principles of the method were three: (1) The correction of lordosis by flexion of both hips while the spine and one flexed hip were immobilised in plaster-of-Paris. (2) The free limb was then fixed in a Thomas knee splint, which was gradually lowered as the tight structures yielded to extension and gravity. (3) The limb in which deformity had been corrected was then incorporated in plaster with the spine, while the other limb was gradually extended.

Tenotomy and tendon lengthening were seldom necessary for the correction of deformity of the hip and knee, and in the case of foot deformities also the temptation should be resisted. The literature of tendon transplantation was so confused that while it easily explained all the failures, it also made the methods which were depended on for success more worthy of publication. He contended that the operation of utilising tendons as ligaments to limit joint movement had a definite value in infantile paralysis. His own practice was to suture tendons under considerable tension, and he did not consider it essential that, even in the foot, the point of insertion should be periosteum or bone. He often employed tendon fusion of the anterior tibial muscles in preference to transplantation of an individual muscle in cases of weakness of the anterior tibial group.

Conclusions.

Mr. Dunn set out his main conclusions under the following four heads:—

1. That the most important period in the treatment of muscles weakened as a result of infantile paralysis was the acute illness, and if necessary a prolonged convalescence.
2. That division of tendons or muscles was seldom necessary for correction of deformity.
3. That successful transference of muscle power to a new insertion, given good surgical technique, was dependent mainly on recognition of the group action of muscles.
4. That tendon transplantation should always be helpful, but would seldom, by itself, produce spectacular success in the restoration of function in infantile paralysis.

Discussion.

Mr. T. H. OPENSHAW said he had not been able to satisfy himself that in a single case of the many he had dealt with the peroneus longus had become active as an inverter of the foot. He agreed with the President, too, that the transference of the biceps into the quadriceps was not a success.

Mr. R. C. ELMSLIE said he felt that the President had emphasised in this address the principles which should be in the minds of those who were engaged in teaching. He had also insisted that the various methods of tackling these problems must be combined suitably. The surgeon should, in fact, draw up a programme of procedure in each individual case; each process should be considered in relation to the others, and not as a separate entity. In transferring tendons it was necessary to decide whether the tendon chosen for carrying out the new function was capable of it. He intended to operate on these cases less frequently in future.

Mr. HARRY PLATT (Manchester) expressed his particular agreement with the President's remarks on the subject of flexed hips. Like Mr. Elmslie, he felt

that he had operated too often in the past, though not in the immediately preceding five years. He now thought that operations for even the most extreme deformities in poliomyelitis were unnecessary, though later on some form of tendon transplantation in the hip might help the gait and general function of the patient. Though admittedly it was desirable to reduce the problem of transplantation to one of simplicity, it was not wise to ignore some of the minutæ in the transplantation technique, as they had a great bearing on the success of the various operations.

Mr. G. R. GIRDLESTONE said his feeling was that in the treatment of infantile paralysis there had been too much tendency to try to put the foot at right angles. Most of these cases had two complications—a short leg and a weak or a paralysed quadriceps. A somewhat tight tendo Achillis did no real harm if the person had a short leg, because the heel could ultimately be raised to correspond. In infantile paralysis one should avoid putting the foot up at a right angle. A weak dorsiflexor group could be got over by lifting the foot an extra height in walking. The most crippling paralysis was that of the gluteus medius, and he would have liked to hear what was the President's practice in regard to replacing this muscle.

Mr. H. A. T. FAIRBANK asked what steps Mr. Dunn took in regard to the after-treatment for flexion of the hip. He, the speaker, admitted he had operated unnecessarily for this condition. He had found he had to use hyperextension of the hip at night for a long time afterwards, so as to ensure against recurrence of flexion. In tendon transplantation he had felt for many years that the selection of the suitable tendon for transplantation was far more important than anything else. A fairly general mistake seemed to be not putting enough tension on the grafted tendon. For some years he had put a good deal of tension on the tendon; then, if the suture held, the result was far better. The tendon he most often grafted was the extensor hallucis. He spoke favourably of combining arthrodesis with a tendon transplantation operation.

Mr. MITCHELL SMITH spoke gratefully of having come under the influence of the school which the President represented, remarking that nowadays there was a great tendency to get back to making corrections by surgical procedures.

Mr. W. ROWLEY BRISTOW asked the President's experience on tendon transplantation about the shoulder, especially for paralysis of the deltoid. To the speaker arthrodesis of the shoulder in infantile paralysis did not appeal in the same way as it did to some others. He took up a defence of the position of bringing about a quick correction of deformity as against gradual correction, though the President had the great advantage of a special team at Baschurch for the carrying out of the latter. He did not think such good results as Mr. Dunn had detailed could be obtained without a specialised staff such as the President was fortunate in possessing. He wondered whether Mr. Fairbank, Mr. Elmslie, and others who declared their intention of using gradual correction more would take the same attitude a few years hence. The clear enunciation of leading principles in this address would prove very valuable to those practising the specialty.

Mr. B. WHITCHURCH HOWELL said that many of the failures had been due not so much to lack of muscle balance or of anatomical alignment of the new tendon as to lack of splitting up of the muscle near its origin, so as to get a muscular pull as well as a tendinous pull. Also, orthopædic surgeons had been brought up to stimulate these transplants rather late in the operation. He was taught to transplant at the end of the sixth week after the operation, but he had beneficially reduced the time to three weeks, and then to four days. He would like to hear more detail on the after-treatment of tendon transplantation, especially in paralysis of the upper limb, which was more important than that of the lower.

The PRESIDENT, in the course of a detailed reply, said that the main feature in the later success of tendon transplantations of musculo-spinal paralysis of the wrist was that at the Shepherds Bush clinic they got to understand the tension under which the transplanted tendons should be sutured. He had had no experience of tendon transplantation of the shoulder which had been effective. With regard to Mr. Bristow's advocacy of quick correction of deformity, the absence of a specially skilled staff should not prevent the recommendation of the best method. He knew of no successful transplantation or treatment by splintage apart from fixation of the hip-joint in cases in which the gluteal muscles were severely paralysed, and that was the reason he emphasised the importance of gradual correction of deformity in flexion contraction of the hip-joint, rather than sacrificing the gluteus medius by rapid correction.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some of the 1927 statistics of three of our largest cities:—

Name of city and estimated mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Diarrhœa, &c., under 2 years.	Maternal mortality from childbirth.
Birmingham (951,100) ..	18·1	11·7	1·07	1·38	2·3	1·8	75/33	11·5	3·6
Manchester (764,420) ..	17·1	13·8	1·38	1·42	3·5	1·5	86/35*	11·3	4·8
Sheffield (524,900) ..	16·2	12·3	0·89	1·39	2·6	1·7	91/40	8·1	7·3

* Approximate figure.

The death-rates per 1000 births among children over 1 and under 5 years of age add to the interest of the above comparison. They are Birmingham, 34; Manchester, 55; and Sheffield, 50.

Birmingham.

Dr. H. P. Newsholme, whose service in Birmingham only began in 1928, draws special attention to the distribution of mortality during the early weeks of infancy. Figures are given which show that the mortality from stillbirths and during the first week of life is equally heavy in the central wards and the wards of the middle and outer rings, and that it is not dependent on social conditions, being as high in the residential wards of the city as in the poorest areas. The neonatal mortality is not being seriously reduced. It was higher in 1927 than in 1926, and investigation shows that it is not appreciably affected by the factors which influence infant mortality after the first month. Of 471 deaths occurring during the first two weeks of life 281 were classed as from prematurity, 19 from birth injuries, 18 from convulsions, 13 from congenital debility, 28 from atelectasis, 26 from congenital heart disease, and 19 from congenital deformities. "Everything goes to show," says Dr. Newsholme, "that only intensive antenatal work with its influence on the mother's health and with the consequent diminution both of difficult confinement and of injury to the child's health before birth will be of real value in reducing neonatal mortality." A further effort is to be made to help midwives to deal with premature and feeble infants by the supply of special prematurity outfits and by encouraging the midwives to invite help from the health visitors earlier in such cases. A special inquiry was conducted with regard to premature infants at the request of the Ministry of Health. The inquiry included 500 such cases. Of 136 born in institutions 52 were alive at the age of 12 months,

while of 364 born at home, 124 were alive at the age of 12 months. Of the 176 who reached the age of 12 months, 80 per cent. were healthy children. Of the 324 who died before reaching the age of 12 months, 288 died within four weeks of birth and 126 died on the first day. These last figures again emphasise, says Dr. Newsholme, the need for intensive antenatal work.

There were 521 stillbirths in 1927 as against 585 in 1926. The midwives' cases are investigated immediately, the other cases at the end of a fortnight. A second visit is paid at the end of six months, so that in case of pregnancy antenatal care may be urged. Several points emerged from the investigation of these stillbirths. The age of the mother was not significant, nor was the question of legitimacy. A high proportion was associated with prematurity. In 25 per cent. the fœtuses were macerated. In 22 per cent. the presentation was a breech. The history of the multiparæ showed that 40 per cent. had had previous miscarriages or stillbirths, and that the 309 mothers had had 678 abortive conceptions out of 1697 pregnancies. The antenatal clinics have been increased in number, and 28 per cent. of the expectant mothers attended. At the Carnegie Institute a special investigation as to the cause and treatment of anæmia in young children was undertaken. The barrier system of nursing at the Babies' Hospital, Witton, was found useful in preventing the spread of infection. At the municipal maternity home, of 357 cases admitted 26 came in for antenatal treatment and were readmitted for confinement. The births which occurred in institutions amounted to 24 per cent. of the whole. There are now 40 home-helps, who attended 327 cases. One large firm has arranged with the Health Department to guarantee the fees of the home-help for the confinement or non-infectious illness of the mother in the case of their workpeople. Of 214 notified cases of puerperal fever and pyrexia, 123 were removed to hospital; in 18 instances a consultant was provided under the regulations and in 5 cases a nurse. Since 1912 the Women's Hospital has been available for all these cases, and any Birmingham practitioner may thus have his puerperal sepsis patients removed into a hospital having a first-class staff of physicians and surgeons.

Mr. Brennan DeVine, F.R.C.V.S., reports that there were 1531 dairy cows in the city cowsheds at the end of the year, and that during the year 12 tuberculous cows were found in the city sheds and dealt with under the Order. Of these, 8 had tuberculous udders, 1 emaciation, and 3 "other signs." At the beginning of the year there were 22 herds, comprising 696 cows, in the special scheme for the eradication of bovine tuberculosis, and at the end of the year 21 herds, comprising 713 cows. At the half-yearly testings there were 1513 cows which passed the test and 373 which failed. The samples of mixed milk from outside sources examined for tubercle numbered 835, and 60 of these, or over 7 per cent., were found to be infected.

Manchester.

Dr. R. Veitch Clark says that Lancashire's special problem of mule-spinner's cancer is the focus of the special research work undertaken by the Manchester Committee on Cancer. The following are some of the results obtained. Cancer has been produced in mice by the application to the skin of petroleum lubricating oils actually used in cotton mills. The toxicity of this oil is not increased by use on the spindles. A shale lubricating oil was found to be much more carcinogenic than petroleum oil. A lubricating sperm oil appeared to be harmless. Treatment with sulphuric acid reduces the carcinogenic properties of some toxic oils. A synthetic tar has been prepared which is 30 times more carcinogenic than the ordinary lubricating oils used in cotton mills, thus giving "hope that we are on the track of the active carcinogenic agent in lubricating oils." Another discovery suggests that cancer would be less prevalent among workers engaged in making coal-dust briquettes if bitumen were used as a fuel-binder instead of pitch.

Towards the end of 1927 there was an outbreak of small-pox, with 36 notifications up to the end of the year and no deaths. It is intended to launch a scheme for the immunisation of children against diphtheria and, as a preliminary, on Oct. 1st, diphtheria prophylaxis was offered free of charge to any persons desirous of being protected. At the Monsall Hospital scarlatinal toxin has been used for scarlet fever convalescents who show a persisting positive Dick reaction, in order to prevent relapses. The results are claimed to be successful.

Dr. Clark comments on the persistence of the high maternal death-rate from childbirth. A table shows that the rate of 4·81 has to be compared with 4·58 for 1926, and that we have to go back to 1891–1895 to find a quinquennium with a higher rate than that for 1927. The admissions for puerperal sepsis to Monsall Hospital numbered 119 with 12 deaths, a case fatality of 10·1, which may be compared with a case fatality of 19·0 for 1926 and 15·2 for 1925. This satisfactory improvement has occurred in spite of the admission of a large number of severe cases late in the disease. The average day of disease on admission was the fifth. The treatment by lymph drainage of the uterus has not been so extensively employed, as different standards have been adopted in selecting the cases suitable for this treatment. In view of the unsatisfactory position of the mortality from childbirth, Dr. Clark emphasises once more "the need for a greater development of our antenatal work in conjunction with our medical practitioners and midwives on the one hand and the larger maternity institution on the other."

There were 65 cases of encephalitis lethargica notified, and there were 37 deaths from this disease, 12 of which were of persons notified in previous years. Representatives of the guardians and the Education and Public Health Committees are to consider a joint scheme for the institutional treatment of survivors from this disease. Success is reported from the intravenous injection of highly concentrated antidiphtheria serum in severe and laryngeal cases of diphtheria. The trial on a small scale of convalescent serum for the prophylaxis of measles has also been successful. Of 171 cases of ophthalmia neonatorum, two cases were blinded in the eye and one was blinded in one eye with the other eye damaged. Lieut.-Col. J. W. Brittlebank, M.R.C.V.S., comments unfavourably on the administration of the Tuberculosis Order, and points out that the percentage of tuberculous milk was 11·1 as compared with 10·3 in 1926. Last year there were 61 city farms with accommodation for 1179 cows, and among these one case of tuberculosis of the udder was found. In 1927 the city farms were reduced to 53, owing to the spread of housing estates and the lack of grazing, and on these 53 farms with available accommodation for 1016 there were housed 823 cows. No case of tuberculosis of the udder was found among them during the year. It is of interest to compare these results with the experience of Birmingham and Sheffield. In Birmingham the city cow-sheds, with accommodation for 1531, furnished 8 cows with tubercle of the udder, while the Sheffield city cow-sheds, with accommodation for 2307, furnished 23 cows with tuberculous udders. Furthermore, the experience of Sheffield for a long period has been that 100 cows' stalls will supply, on an average, about one tuberculous udder per year.

The Regional Smoke Abatement Committee has been reconstituted as an advisory committee, which has been joined by 72 of the 102 authorities in the area, with a population of 2,761,900. The 30 non-joining authorities had a population of 417,200. Three important matters considered by the committee were the "patrol system of inspection," the "standard definition of black smoke," and "the time concession." Dr. Clark thinks that by instituting the adoption of a uniform standard of administration

and by-laws this advisory regional committee will exercise a great influence for good.

Sheffield.

Dr. F. E. Wynne says the most important event of the year was the increased prevalence of small-pox. During 1924 there were 4 notifications, during 1925 44, during 1926 157, and during 1927 667. The peak was reached in January with 316 cases. During the next five months the numbers were 155, 64, 29, 30, and 20. During the second half of the year the monthly average was about 10 cases. The accommodation for contacts, while their houses were being disinfected and cleansed, had to be increased. Much work in the confirmation of diagnoses fell on the medical staff, who received temporary assistance during January and February. It is estimated that since 1925 about 100,000 persons have been vaccinated, mainly in the infected areas of the eastern part of the city. The suggested association of vaccination with encephalitis caused anxiety, seeing that Sheffield was one of the areas most seriously affected by encephalitis in 1924, when there were 300 ascertained cases. Charts are given in the report, showing the incidence of small-pox and of encephalitis during recent years, and the amount of vaccination practised corresponded closely with the cases of small-pox notified. The charts do not indicate the slightest association between the incidence of encephalitis and vaccinia. The only death attributed to small-pox was that of a male baby in the fourth week of life. The new houses certified during the past four years were 1061, 2178, 2714, and 1897. Of the last-mentioned 1897 723 were erected by the corporation. Dr. Wynne says that "the amount of overcrowding continues to be deplorable," and that it is still impossible to close houses which are unfit for habitation and ought to be condemned. Three small condemned areas, involving 173 houses, have been cleared and the tenants removed to Wybourn estate, and an area of 126 houses was condemned in May, 1928. The new premises for maternity and child welfare work were opened in October by the Minister of Health and provide "ample accommodation for this most essential work, including the rapidly extending prenatal work for many years to come." The accommodation in the new maternity block at Nether Edge Hospital, opened in March, has also been much appreciated.

In April Sheffield and Rotherham coöperated to form the first statutory joint committee under the Smoke Abatement Act of 1926. The staff of smoke inspectors has been increased and several important conferences have been held with the Sheffield and District Engineers Employers' Federation. It is hoped that the work of this joint committee will shortly be linked up with that of other joint committees in the West Riding, and a common policy for smoke prevention established over an enormous industrial area with the cordial coöperation of employers of labour and local authorities. The commercial development of smokeless fuel for domestic and other purposes is being followed with great interest.

Sheffield's death-rate from tuberculosis in 1927 was less than that of England and Wales and also less than that of any of the towns with populations exceeding 200,000. The report of Dr. John Rennie, the tuberculosis officer, shows that, out of 1762 new notifications of tuberculosis of the lung, tubercle bacilli were found in the sputum in 19·2 per cent., and that a large proportion of the remaining 80·8 per cent. were notified in the early and curable stage of the disease. That the dispensary is well used for diagnostic purposes is indicated by the fact that 2584 suspects were sent up. The number of contacts examined was 1643. A table giving the interval between notification and death of the 354 cases of pulmonary tuberculosis which ended fatally in 1927 shows that death occurred within a year in over 55 per cent. More than 15 per cent. died in the second year, and 27 cases, or 7·6 per cent., had lived for six years or more after notification. Of these last 27, 16 had had tubercle bacilli found in their sputum, as follows: in three cases 5 years before, in four cases 6 years, in two cases 7 years, in three cases 11 years, and in one case each 12, 16, 20, and 24 years before. It was noteworthy that the recorded deaths were about equal in number to the notified cases with T.B. in their sputum, and that in 75 per cent. of the deaths the diagnoses had been confirmed by the finding of T.B. in the sputum. The beds available for pulmonary tuberculosis have been increased to 505 by the provision of 47 beds for women at Nether Edge Hospital. Dr. C. Lee Pattison, the surgical tuberculosis officer, shows that the children treated at King Edward VII. Hospital are being admitted at an earlier stage of the disease and need less prolonged treatment. Thus, in 1920 the number admitted was 75 and the average duration of stay of the discharged patients was 695 days, while in 1927 the number admitted was 168, and the average duration of stay of those discharged was 248 days.

PORT SANITARY AUTHORITIES.

Manchester Port.

Dr. W. F. Dearden, in his twenty-second annual report, mentions that no cases of cholera, plague, or yellow fever reached the port during 1927. Apparently 1 case of enteric fever, 3 of phthisis, 3 of tuberculosis, 19 of malaria, 1 of pneumonia, and 1 of scarlet fever came to notice in ships arriving. No notifiable diseases occurred in canal boats, but 4 cases of measles and 1 of suspected phthisis were discovered in one, and chicken-pox and whooping-cough in groups in others. On board ship 2245 rats were killed and 2476 ashore; 21 were examined and found free of plague; 28 ships were fumigated with sulphur dioxide (15 rats the average found on each); trapping killed 86 on one ship; most of the rats killed and identified on ships were brown. There were condemned 1½ tons of meat, 503 tons of vegetable food, including 378 tons of wheat and 103 tons of oranges. Among the 2168 vessels inspected, 580 (26·7 per cent.) had insanitary conditions, a slight increase. There were defects in 30 per cent. of British and in 14 per cent. of foreign steamers. Dealing with the general question of sanitation on shipboard, Dr. Dearden observes that while the ordinary workman has two sets of risks—occupational at his work and domestic in his home—for the seaman on duty 24 hours each day, all his risks are occupational, food, water-supply, and sanitary conditions included. A list of seamen's illnesses over ten years (apparently compiled from ships arriving at Manchester) is headed by infectious fevers, and it is noted, on the authority of the Registrar-General, that merchant seamen have almost twice the average liability to death from respiratory tubercle, and five times that from injury. Dr. Dearden remarks that since in our laws "not much printers' ink is wasted on ships' hygiene," the standard on British ships depends on the meaning given by the Board of Trade to the word "properly"—e.g., "properly ventilated," Merchant Shipping Act, 1894. Where Norway orders, we recommend. Dr. Dearden's chief complaint is of overcrowding, comparing the 120 cubic feet per man legal at sea, with the 300 required in common lodging-houses; dampness of quarters predisposes seamen to rheumatism, and the report shows that of 723 defects reported in the year, 93 involved this quality of dampness. He warmly approves the recommendations made by the Association of Port Sanitary Authorities in 1922 for the hygiene of crew spaces. Of these, No. 10 insists that the Board of Trade standard of lighting should be strictly adhered to; as a matter of fact, in the next year the Board reduced this standard by one-third. Dr. Dearden's valuable note on sanitation at sea deserves to be widely read.

Hull and Goole Port.

Dr. W. Allen Daley says that while more ships arrived in 1927, no cases of cholera, plague, yellow fever, small-pox, or typhus fever appeared. Sanitary

administration cost £4433, of which £2128 was covered by the Government grant, the remainder being borne four-fifths by Hull and one-fifth by Goole. The water-supply of the port is declared very pure, and the water-boats are kept in good order; 142 water-tanks in ships were ordered to be cleaned and this was done. It is observed that many ships have no proper record of the origin of the water in their tanks; the colon bacillus was found in three cases, twice in 5 c.cm., and once in 1 c.cm. Infectious cases go to the City Hospital in Hull, or to the Isolation Hospital in Goole, disinfection of the ship with 4½ per cent. formalin being carried out at once; later, should the diagnosis be confirmed, sulphur dioxide is used for additional security. A motor-ambulance is always available at the disinfecting station, where bedding and the like is dealt with, and where shelters are provided for contacts. The 94 venereal cases were mostly recommended to the clinic. Usual precautions are taken against rats; cyanide fumigation has been tried, although more anxious and expensive than sulphur-dioxide, and needing daylight. Eight ships lost 153 rats under cyanide—19 each; 53 with sulphur, lost 183—3½ each; poison baits are not used, but trapping took 48 rats on each of 79 ships—1½ each. On ships, 8092 rats were killed, 2031 ashore; none of the 661 examined was plague-infected. The rat-proofing of warehouses is not under the port sanitary authority. Over 215 tons of fruit were condemned at Hull, but all the food inspected at Goole was sound. Medical inspection of aliens covered 9593 persons, noticeably clean.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 22ND, 1928.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 113 (last week 92); scarlet fever, 2097; diphtheria, 1122; enteric fever, 88 (last week 122); pneumonia, 587; puerperal fever, 38; puerperal pyrexia, 102; cerebro-spinal fever, 7; acute poliomyelitis, 12; acute polio-encephalitis, 3; encephalitis lethargica, 24; continued fever, 1; dysentery, 10; ophthalmia neonatorum, 106. No case of cholera, plague, or typhus fever was notified during the week. The return for enteric fever includes 27 cases of paratyphoid fever, of which 11 were notified in London.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on Sept. 25th–26th was as follows:—Small-pox, under treatment, 13; under observation, 2; scarlet fever, 1768; diphtheria, 1511; enteric fever, 75; measles, 85; whooping-cough, 251; puerperal fever, 16 (plus 10 babies); encephalitis lethargica, 71; poliomyelitis, 2; "other diseases," 19. At St. Margaret's Hospital there were 16 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 5 (1) from enteric fever, 11 (0) from measles, 4 (0) from scarlet fever, 30 (10) from whooping-cough, 29 (6) from diphtheria, 139 (32) from diarrhœa and enteritis under two years, and 25 (2) from influenza. The figures in parentheses are those for London itself.

The fatal cases of enteric fever outside London were reported from Southend-on-Sea, Wallasey, Hull, and Newcastle-on-Tyne. Of the fatal cases of measles 2 each were reported from Birmingham, Liverpool, and Carlisle, while Belfast reported 4. Southampton, Birmingham, Liverpool, Doncaster, and Newcastle-on-Tyne each reported 2 fatal cases of whooping-cough. There was a further increase in the number of deaths from diarrhœa, of which Liverpool reported 17, Birmingham 13, and Leicester 5, while the figures for Glasgow, Dublin, and Belfast were 8, 10, and 11 respectively.

The number of stillbirths registered during the week was 286 in the great towns (corresponding to a rate of 44 per 1000 births), including 46 in London.

Reviews and Notices of Books.

THE BLOOD PLASMA IN HEALTH AND DISEASE.

By J. W. PICKERING, D.Sc., Lecturer on Hæmatology, University of London, King's College, London: William Heinemann, Ltd. 1928. Pp. 247. 12*s.* 6*d.*

THIS constitutes one of the most valuable works on the subject of the blood published for a long time past. The fact that it is devoted to the consideration of the plasma alone adds to its merit. For all that many recent works on hæmatology have to say on the plasma, the blood might consist of red cells, white cells, and platelets floating, like the heavenly bodies, in a void. This volume is a healthy reminder of the existence of the plasma, its complexity, the subtle, and yet enormously important, changes which it may undergo and its weighty rôle in the life process. The changes undergone by the plasma in the course of coagulation naturally occupy a considerable portion of the book; there are few subjects in physiology about which there has been—and still remains—so great a diversity of opinion, and all opinions are noted and commented upon by the author. The complexity of the various theories of the mechanism of coagulation and the even more maddening complexity of their nomenclatures is known to every medical student, and all who have struggled with the subject will rejoice that the author is able to offer some hopes of the final emergence of a unifying generalisation—"Instead of postulating a large number of bodies reacting in unknown ways, the plasma is seen as a unit capable of easily reacting with foreign substances by its unsatisfied side chains, but returning to a normal condition when the foreign substance has been eliminated." The chapters on the arrest of hæmorrhage, the problem of thrombosis, and the blood of abnormal bleeders, as may be judged from their titles, contain matters of the greatest interest alike to the student, the practising doctor, and the laboratory worker. The last-named chapter contains what is probably the most masterly and yet concise exposition, available in any language, of the relationships of the various types of abnormal bleeding met with in clinical practice. It is interesting to note that the author, on the basis of his own work, finds himself in agreement with the century-old suggestion of Nasse—that the blood of hæmophilics represents a reversion to a primitive type. This is one of the illuminating flashes which occur again and again throughout this volume and make it worthy of careful perusal. A valuable feature is the appendix, containing brief notes of the various coagulants used in clinical practice. Here the author has wisely departed from the usual custom, in so far as he has included all the principal proprietary coagulants on the market, and has thus provided a small codex of immense value to the practitioners.

This book is a model of its kind and a striking witness to the debt owed by practical medicine to the laboratory; it cannot fail to become a standard work, and no student of medicine, qualified or unqualified, practical or academic, can afford to neglect its message.

RECENT ADVANCES IN DISEASES OF CHILDREN.

By W. J. PEARSON, D.M., F.R.C.P., and W. G. WYLLIE, M.D., M.R.C.P. London: J. and A. Churchill. 1928. Pp. 591. 15*s.*

THE authors point out that this is neither a typical unit of the Recent Advances series, nor a text-book in the ordinary sense of the word. Their object has been to formulate principles for solving the problems of disease, and to stimulate discussion on the philosophy of the subject. They have presented a theory of disease, applicable in particular to children, which, while it embodies some principles that are already widely accepted, perhaps carries the process of systematisation to an extreme degree. The

conclusions at which they arrive are in many cases hypothetical and likely to stimulate the controversy which they invite, but the serious attention of all who are interested in the speculative aspect of pediatrics will be arrested by these new ideas. Dr. Pearson and Dr. Wyllie assess the infective factor in disease considerably below the value usually accorded to it, while the constitutional and dietetic factors are given the predominant position. Children are held to deviate from the normal along two definite lines, resulting in the lymphatic, alkaline, hypocalcic type, and the acid, hypercalcic type. A relation is found between these types of constitutional predisposition and the majority of disorders to which children are susceptible, including diseases such as tuberculosis and rheumatism in which an infective element is recognised. In the elaboration of the characteristics of these types attention is focused almost entirely on the physico-chemical aspect; their relation to the endocrine-autonomic system receives some recognition, but the reader is often left in doubt as to the extent to which they are conditioned by the endocrine pattern of the child, or are influenced by environmental factors. Of individual diseases, perhaps rheumatism is the one to which the authors have applied their theory most thoroughly. They suggest that over-production and undue retention of acid is the principal cause, and that strongly acid sweat is an indication of this state. The actual rheumatic symptoms are attributed to excess of calcium phosphate, a condition to which the rheumatic type of child is predisposed. The view that chorea is an inflammatory condition is rejected in favour of the somewhat startling suggestion that it results from excess of phosphate in the cerebellum.

The section on disease of the chest is admirable, and brings into prominence some important clinical points which have suffered neglect in many text-books, such as the distinction between syn- and metapneumonic empyema. A really clear and condensed account is given of the modern conception of nephritis and its extremely difficult classification from the clinical standpoint. Throughout the book the reader is impressed by the evidence of clinical experience and careful observation. On questions of ætiology, the authors, while rightly adopting a more or less dogmatic attitude, occasionally present a somewhat one-sided view of a contentious question. For instance, they adhere strongly to the prenatal origin of cerebral diplegia, and state that the opposing view is "based entirely upon the fact that many cases of cerebral diplegia have a history of difficult or premature birth"—hardly a fair summary of the evidence adduced in favour of a natal origin. A chapter on X ray diagnosis is illustrated by some excellent reduced photographs. Each chapter closes with a small but well-chosen list of references.

This is a book for the post-graduate rather than the student. It contains a wealth of interest, and may be strongly recommended to all who are willing to exercise their critical faculties and to reconsider some of the conventional ideas and classifications of children's disease.

RADIOTHERAPY.

Handbuch der Gesamten Strahlenheilkunde: Biologie, Pathologie und Therapie. Vol. I. Second part. Edited by Dr. PAUL LAZARUS. Munich: J. F. Bergmann. Pp. 225.

THIS is the continuation of the first volume of a comprehensive work dealing with radiotherapy from several points of view. It consists of a number of essays on the biological, pathological, clinical, physical, and engineering aspects. The part under review commences with a chapter by Stephan Mayer on the calibration and measurement of the rays produced by radio-active bodies. He deals not only with the estimation of radio-active salts, but also with radio-active waters and gases. This is followed by a description of modern X ray apparatus for therapy by R. Glocker, who emphasises the importance of the hot cathode tube at tensions of about 200 KV (peak), and of the transformer unit with condensers which produces a practically constant tension. The author goes on to describe various forms of protection which are essential, and a table gives an interesting comparison between the protective qualities of various materials.

In the next chapter H. Behnken gives a brief and readable account of those methods of measuring intensity and quality of the X ray beam which are in use at the present time. It is interesting to note that for the measurement of quality the sphere spark-gap is employed in Germany as in this country, the spectrometric methods, too complicated for every-day use, being reserved for laboratory control. Intensity measurements, on the other hand, are almost entirely carried out by ionisation methods and such accessories as the Sabouraud pastille and the Kienbock strips are now almost of historical interest. The absolute dose of X rays, 1 Rontgen, though carefully defined, is still difficult to measure, except with elaborate precautions. F. Dessauer and B. Rajewsky follow with a chapter on the distribution and conversion of X ray energy in the body. The part which deals with the distribution of X and γ ray energy and the methods employed to measure is instructive. Four possible explanations of the conversion of X ray energy in the human body are examined; and Dessauer's own hypothesis of "point heat" is dealt with in detail. It is perhaps ill-advised that a subject which is still so very hypothetical and, it may be added, controversial, should be given so much space in a text-book. This particular essay is followed by a long list of references to literature. The last two chapters, which occupy more than half the book, are devoted to the histological and pathological aspects of radiotherapy. In the first of these, C. Regaud and A. Lacassagne deal with the physiological reactions in general of the cell to radiation. They then describe the particular physiological reactions of the skin, testes, ovaries, the blood, and the ductless glands to X rays. In discussing the biological effect of X rays, they favour the explanation of direct rather than indirect action, but believe that the latter also occurs. In the last chapter, O. Lubarsch and J. Wätzen discuss the action of rays in a variety of special conditions.

The work is likely to make an appeal to those medical men who, while actively engaged in radiotherapy, are anxious to explore the theoretical basis of their specialty.

THE NOSE, THROAT, AND EAR.

By JOHN F. BARNHILL, M.D., F.A.C.S., Professor of Surgery of the Head and Neck, Indiana University School of Medicine. London and New York: D. Appleton and Co. 1928. Pp. 604. 30*s*.

THIS is a text-book on diseases of the throat, nose, and ear written for students and practitioners. It is a large volume, and the author attempts to include regions and diseases which are not usually described in such works. Thus diseases of the mouth and tongue are discussed, but, in some instances, at a length not sufficient to be of real value; the space allotted to cancer of the tongue is wholly inadequate. A considerable section is devoted to facial neuralgia, and injection of the Gasserian ganglion is clearly described; but the eight lines devoted to acromegaly, and the six lines on stammering, are really useless. The omission of such extraneous matter would have allowed more space to be devoted to the common and important diseases of the nose, throat, and ear. The section on the ear is the best, and the chapters on the larynx the least satisfactory in the book. The illustrations are numerous and helpful, but here, again, those showing intralaryngeal disease are less good than the others. There is some evidence of want of care in revision; for instance, tabes is not mentioned among the causes of paralysis of the vocal cords, and the old fallacy that papillomata may become malignant is twice repeated. The accounts of common operations, such as tonsillectomy and

those on the mastoid, are excellent, and the indications given for operation on the ear are sound and well set out.

GYNÆCOLOGY WITH OBSTETRICS.

Second edition. By JOHN S. FAIRBAIRN, M.A., B.M., B.Ch., F.R.C.P. Lond., F.R.C.S. Eng., Obstetric Physician to St. Thomas's Hospital. London: Humphrey Milford, Oxford University Press. 1928. Pp. 810. 25*s*.

IN certain countries at the present time attempts are being made to divorce gynæcology from its sister subject obstetrics, and to combine it with certain other branches of abdominal surgery. Dr. Fairbairn, in common with other leading men in this country, feels that for a proper understanding of diseases in the non-pregnant female organs of generation an extensive knowledge of the physiology and pathology of pregnancy and parturition is necessary. In this small volume he has welded the two subjects together in a manner which only a master of the art of teaching could contrive. The student will find in it everything he is likely to require in the examination room or in general practice on diseases and conditions peculiar to women. Moreover, the ethical and medico-legal aspects of the subject are well set out. Failure to observe the regulations laid down for the notification of births and diseases associated with parturition often cause the young practitioner considerable inconvenience. The author has made the obligations of the medical attendant quite clear. Throughout the book Dr. Fairbairn relentlessly follows the late results of bad midwifery to their logical conclusion, and impresses the reader with the importance of the part his subject plays in the science of preventive medicine. As to gynæcology, it is the principles rather than the practice of operations that are here discussed, and the surgeon will have to go elsewhere for operative detail.

The first edition of this book had insufficient illustrations on the pathological side. Now 38 excellent new figures have been added. Other alterations have been found necessary as the result of recent work on the anatomy and physiology of reproduction and the increasing importance of radium therapy in the practice of gynæcology. We predict for this admirable work a long period of increasing popularity.

A TEXT-BOOK OF HISTOLOGY.

Arranged upon an Embryological Basis. By Dr. FREDERIC T. LEWIS, Associate Professor of Embryology at the Harvard Medical School; and Dr. J. L. BREMER, Associate Professor of Histology at the Harvard Medical School. (Being a third edition of the Text-book of Histology by Lewis and Stöhr.) Philadelphia: P. Blackiston's, Son and Co. Pp. 551.

THIS text-book is planned on the method of teaching in use at the Harvard Medical School. The earlier editions were founded on Prof. Stöhr's German Text-book of Histology but, since the introduction of embryology into the teaching of histology was not favoured by Prof. Stöhr, the entire responsibility for the later editions has been taken by the present authors. The method, although rational, is at a disadvantage in an elementary text-book. The descriptive accounts of histological structure are too often interrupted by the introduction of embryological matter, so that the important points of histology stand out less prominently than they should do. While the book should prove helpful to one who has some previous knowledge of the subject, being thoroughly up to date and reliable, it may prove stiff reading for the beginner. The section on the endocrine glands is particularly interesting and embodies the latest teaching on that subject. Throughout the book numerous references are made to current literature and many instructive descriptions of research methods are given. The numerous coloured drawings and diagrams are well chosen.

MEDICAL JURISPRUDENCE AND TOXICOLOGY.

Sixth edition, revised. By WILLIAM A. BREND, M.A. Camb., M.D., B.Sc. Lond., Lecturer on Forensic Medicine, Charing Cross Hospital. London: Charles Griffin and Co., Ltd. 1928. Pp. 327. 10*s*. 6*d*.

THE new edition of Dr. Brend's well-known handbook retains the useful format of its predecessors and has been made of increased value by the incorporation of matter relating to recent important legislation. The changes involved in the Coroners Act of 1926, the Mental Deficiency Act of 1927, and the Registration of Births and Deaths Act of 1926, are here given full attention. In the section dealing with toxicology no mention is made of poisoning by arsenobenzol compounds, and the effects of intoxication by dial, allonal, and other preparations of barbituric acid are dismissed rather more briefly than they merit. On the other hand, the paragraphs relating to the effects of gaseous poisons in war are perhaps redundant. These are, however, minor details in a volume which epitomises the main facts of medical jurisprudence in an admirable manner.

JOURNALS.

JOURNAL OF INDUSTRIAL HYGIENE. September.—Alice Hamilton points out how publicity given in America to the toxicity of benzol has led to great decrease in its industrial use. Benzol-rubber solution is being replaced by rubber latex, a change claimed to be as important as the substitution of sesquisulphide of phosphorus for yellow phosphorus; the new material is now used in canning, making tyres, cementing shoes, and making dipped rubber goods. Toluol is replacing benzol in cellulose coatings and lacquers, and naphtha in dry cleaning. This poisonous solvent should soon disappear.—The result is reported by W. Wright, C. O. Sappington, and E. Rantoul, of an investigation of 102 public water-supplies, supplied through lead pipes; 253 persons, chosen haphazard, drinking these waters, were medically examined. All the waters contained lead, the amount being more closely related to the carbon dioxide content than to the length of lead pipe. Sixty-three, or 25 per cent., of those examined exhibited signs of poisoning. A dose as little as 1 mg. of lead daily over eight and a half years caused poisoning. The incidence was less among children than adolescents, and greater yet among adults. Women showed a definitely *lower* incidence than men. This investigation, which is given in detail, is one of some importance.—An article on antiseptic spraying receives comment on p. 715 of our present issue.

Reports and Analytical Records.

"PURITY" TIPS TEA.

(GEORGE J. MASON, LTD., BRADFORD-STREET, BIRMINGHAM.)

THIS tea, which has been especially blended, claims to be suited to those who find difficulty in digesting ordinary tea infusions, and who, in addition, prefer a tea of a high grade. On analysis the following results were obtained:—

Moisture	6·2 per cent.
Ash	5·1 "
Caffeine	3·5 "
Tannin	12·2 "
Extract yielded to hot water	38·0 "

The percentage of caffeine to which the stimulating properties of tea are due is normal, and that of tannin distinctly below the average for a tea of this class. Hence this beverage should appeal to those who consider that this latter constituent should be as low as possible. The tea itself is undoubtedly of a high grade, and in the cup it is refined and delicate to the palate.

THE LANCET.

LONDON: SATURDAY, OCTOBER 6, 1928.

THE CONFUSION OF TONGUES.

"Behold, . . . they have all one language; . . . and now nothing will be restrained from them, which they have imagined to do."

DURING the war a pathologist, exasperated by the inefficiency of a qualified assistant sent out from home, protested that "he didn't even know the language." This was held to be a frivolous complaint and evoked the official rebuke that to the medical officers requisitioning reports it would be a welcome change to receive the same couched in terms familiar to them. Unfortunately for this argument they found that the reports signed by the assistant were inarticulate and unhelpful, since instead of using glibly the portmanteau words which express a complicated process in a brief phrase, he was labouring to give expression to conclusions based on observations (which he did not know how to describe) made on material he was incapable of analysing. The moral is clear; special branches of knowledge must develop a terminology because they can progress in no other way. New concepts can, it is true, be explained in simple words by such masters of exposition as Sir ARTHUR KEITH and Sir WILLIAM BRAGG, but only when they have reached a certain stage. The paraphrase of technical terms and expressive symbols is a difficult art, and it would simply be waste of time as between actual workers. In modern medicine there are many expressions pregnant with meaning among workers in a special department which convey little to those engaged in other branches of medicine or harassed by the calls of general practice. Examples taken at random are the pH of the blood, Weber's law, the reticulo-endothelial system, the Nonne-Apelt test, dysgenetic epithelial hyperplasia of the breast, a shift to the left in Arneth's count, Angstrom unit, buffer substance, platelet count, oxytocic activity—the list might be multiplied indefinitely. This Babel of tongues may be regretted by the antediluvian, but it is a factor of progress and must be accepted as such.

How, then, can we promote coöperation between the different sections of our science, or, as a practical problem, how can we enable the practitioner to interpret the aid which specialists are prepared to offer without expecting from him the impossible effort not only of learning but of keeping up with all these languages? We have seen that one apparently obvious way leads nowhere, or anyhow to an uninspired and dull light. This is only in accordance with general experience. If we want from a foreigner an authoritative opinion we know that he will be fluent and informative only in his native tongue. It is worth while to discourage his halting and cramped attempts at English (this is sometimes difficult) and to urge him to express himself in his own language. The reproach, therefore, that pathologists and biochemists especially couch their reports in a jargon meaningless to practitioners should not be made without considering the alternatives open to them. Some of the terms used are convenient symbols, the significance of which could only be explained to the uninitiated by means of long argument. The place for this is not in the individual report but, as we hope to show, in an article planned for the purpose. But it is clear that if we are to use to the full the experience gained by these children of medicine who have travelled widely in neighbouring lands, we must acquire the means of interpreting their languages. It is regrettable that some of them should not be in a position to help, having apparently quite forgotten their simpler mother tongue; while others, as Sir THOMAS HORDER pointed out in an address to the Association of British Pathologists,[1] confuse the issue by prolixity, by personal bias in favour of criteria not generally accepted, or by the use of individual instead of standard notation. We can fairly urge each set of specialists to decide on a common nomenclature, so that one can expound the views of another, even as a good system of shorthand enables one typist to transcribe the notes of another. So much having been achieved, there would still remain the problem of interpreting the general import of the message to those who have not recently been through an intensive post-graduate training in the specialty concerned—be it pathology, ophthalmology, radiology, or whatever.

Encouraged by the success of the series of articles on "Modern Technique in Treatment," we have decided to attempt this more difficult task in our columns. Starting on Sept. 1st of this year we have already dealt with the interpretation of agglutination reactions, swabs from the nose and throat, and sputum; and to this issue Dr. J. G. GREENFIELD contributes the first of two articles on the cerebro-spinal fluid. Among others to appear in the immediate future are those on the interpretation of glycosuria, the Arneth count, auditory tests, chemical analysis of the fæces and of the blood, renal function tests, to mention only a few. They are contributed by invitation addressed to specialists who are known to have a keen appreciation of clinical needs, or to those who have discovered for themselves how best to interpret various aids to diagnosis and are willing to give to others the benefit of their experience. Not all articles will seem of interest to all readers at the time of their appearance, but our intention is that they shall serve as a source of quick reference when a report arrives, and of information as to when a test should be requisitioned. The ground to be covered is very large, and no attempt will be made either to map it out on a systematic plan, or to give any more details of the methods used than will suffice to indicate their purpose. Books on technique are plentiful, but notes on interpretation are scattered widely and difficult to find. It is this gap which, with the help of our contributors and our readers, we propose to try to fill.

MEASLES.

MORE than a decade has passed since the first attempt was made to use the serum of convalescents for protecting children against measles. The fact that the method has not come into general use in this country must be attributed either to its inefficacy, to its uselessness as a practical measure, or to failure of publicity. The importance of measles as a cause of death in childhood makes it worth while to review the facts as we know them to-day.

In the course of some experiments on monkeys in 1911 it was discovered that the animal's blood had

[1] THE LANCET, July 21st, p. 136.

protective properties when they had recovered from the disease. From this it was an obvious step to the use of serum from convalescent patients, and the subsequent investigations seem to leave no doubt that such serum is of value as a prophylactic. In our present issue, for example, Dr. WILLIAM GUNN records a series of observations which show how useful it can be in giving temporary protection to those exposed to infection, and although there are exceptions the general tenour of reports from many parts of the world is equally favourable. If administered intramuscularly up to the fifth day after exposure, convalescent serum, in doses of 5 c.cm. for children under 5 years of age, will almost always prevent the disease from developing, and even if it is given after the fifth day the infection will be modified according to the dose and the period which has elapsed. That so many workers have reached these conclusions suggests, on the face of it, that serum should be freely employed. On the other hand, it is reasonable to argue that no good can come from the brief protection which the serum affords, and admittedly the child receiving this passive immunisation becomes again susceptible to the disease within a few weeks, which makes it necessary to repeat the dose at every exposure to infection. Again, it may be urged that the low mortality of measles among upper-class children shows that the cases only need good nursing, whilst there is no place for preventive methods where everyone must sooner or later be infected. And these objections seem reasonable enough in their way. But the fact remains that children are not always nursed, and cannot always be nursed, in good surroundings, and that last year the disease killed five times as many people in this country as scarlet fever. Most of these fatalities—and the totals involved are enormous—occurred in children under 3 years of age, and since everyone agrees that the longer an attack can be postponed the less likelihood there is of complications or death, they constitute a very powerful argument in favour of immunisation. Furthermore, when children are congregated in schools and hospitals they are liable to suffer much more severely from measles infection, and, as we have several times insisted, it is very undesirable that the complaint should be allowed to take its course in schools or institutions where secondary infections are often contracted. As, however, measles differs from most of the other infectious fevers in its extreme contagiousness, prompt isolation is generally useless, and the only way of checking an epidemic is some such form of prophylactic agent as is available in convalescent serum. Even should the authorities of a school fail by this means to prevent an epidemic, they may be sure that they will lessen the trouble and damage done by the disease, for the attacks will as a rule be mild and recovery speedy, the patients nevertheless gaining the usual permanent immunity to the disease.

For the reasons we have outlined, those competent to judge are generally convinced that the beneficial results of convalescent serum in the prophylaxis of measles cannot be too widely known, and they are anxious to make it clear that the serum will be of some value at whatever time in the incubation period it is given, although, of course, the sooner it is given the better. If by these measures the high mortality in young children can be prevented and the distressing complications reduced, it is exceedingly desirable that a plentiful supply of serum should be ready for those who need it. Unfortunately the task of collection is difficult in London, for, as Dr. GUNN shows, only 2 per cent. of the measles patients admitted to the Metropolitan Asylums Board hospitals are over 7 years of age, so that the blood of adults is not often forthcoming. This scarcity has encouraged a great deal of research into methods of procuring immunised serum from animals, but so far the results have not been very satisfactory. The causal organism of measles has not yet been definitely isolated, and most investigators report unfavourably on the use of the so-called anti-measles sera made from horses and goats. HOYNE and PEACOCK in Chicago give a good account of goat serum which they have tested, and other workers have also had successes; but those who study Dr. GUNN'S paper will not feel encouraged to pin their faith to any of the animal sera which he has tried, and will prefer to use convalescent serum if they can get it. We hope that an increasing demand will bring about an increasing supply of suitably tested human serum, and the time is ripe, if not over-ripe, for the launching of a big scheme for its collection at hospitals.

THE AUSTRALASIAN COLLEGE OF SURGEONS.

WE have just received the first number of a periodical which will have a warm welcome in this country, for it is the *Journal* of the College of Surgeons of Australasia. Those who have heard something of the difficulties which have beset the College since its birth will be especially glad of this sign that it is making an auspicious start in its "endeavour to promote the science and art of surgery." This is the description of its aims given by the President, Sir GEORGE SYME, and he has elaborated them by saying that they will be carried out "by arranging for special post-graduate training in surgery, and by establishing standards of surgical competence and surgical ethics." Hitherto there has been little or no post-graduate surgical training available in the Commonwealth or in New Zealand, and the College will be doing excellent work if it can remedy this very serious deficiency. It should be understood, however, that it is not a teaching institution, nor does it confer a registrable diploma, and on this departure from the British precedents a good deal of criticism has been based. A principal hope of the Founders is that the new institution will be able to check some of the commercialism which is apt to creep into professional life, and they are deeply concerned to discourage the practice of surgery by persons who have no special ability, training, or experience. This end will be partly achieved, they believe, if persons of approved skill and integrity received a hall-mark which the public can recognise, and they trust that the association of members of the surgical craft in one body, bridging the gulf between State and State, will result in a more perfect service to the community. The conferment of the Fellowship by election rather than competition has unfortunately led to misunderstanding, and there is a feeling among general practitioners that a large proportion of surgical work ought to remain in their own hands, since it is unwise to expect sound emergency work from those who send all their ordinary cases to a specialist. We trust, however, that these problems will solve themselves in course of time, so that the admirable aims of the Founders may be harmoniously attained. The new journal, if it maintains its present standard, will go far towards realising one of them.

THE MEDICO-LEGAL SIGNIFICANCE OF BLOOD GROUPS.

THE blood groups of the human race have received a great deal of attention during the last ten years, and certain facts concerning them are now established. Thus it is universally admitted that the red cells contain the agglutinable factors A and B, though this does not exclude the possibility that there are other "agglutinogens" as well. It is also agreed that A and B may be present in the red cells either singly or together, or that they may be absent altogether, and that on the basis of these four possible combinations all bloods may be divided into the four groups now usually referred to as AB, A, B, and O, and corresponding to Groups I., II., III., and IV. (Moss), or IV., II., III., and I. (Janssky). The presence or absence of A and B in any given blood may be demonstrated by the use of sera known to contain the homologous agglutinins and usually described as α and β. Further, there is evidence, apparently conclusive, that, when once established, the group constitution of a given blood never changes; and, lastly, there are strong reasons, both theoretical and empirical, for believing that A and B are Mendelian dominants and are transmitted to offspring according to well-established laws. From this it would follow that A and B cannot appear in the offspring unless present in the parents, and the recent work of F. BERNSTEIN [1] makes it almost certain that O also is a dominant. If this can be proved it means not only that matings involving a parent of the group constitution AB can never give rise to offspring of the constitution O, but also that matings involving both AB and O can never result in offspring of either of these groups.

Even in the present state of our knowledge it is evident that the subject will become of great importance in forensic medicine. Some years ago SCHÜTZE demonstrated that it is possible to determine the groups of blood which has existed in a dried state on fabric for many months, and the establishment or disproof of the identity of group of blood stains on the clothes of the suspect and the blood of the victim may serve to complete or demolish a chain of otherwise circumstantial evidence. It is, however, in civil cases involving questions of paternity that the blood groups may be expected to play their most important part. It is true that by reference to the groups we shall never be able to identify the father of a given child, but in a very fair proportion of cases it may be possible with absolute certainty to state that the alleged or putative father of a given child is not the father in fact. The importance of this means of establishing non-paternity is obvious and has its applications in suits for maintenance of children born out of wedlock and in cases of alleged adultery. That blood tests have not as yet been much invoked in civil processes in this country may be taken either as a tribute to the excellent state of the public morals or to what is usually described as the "innate conservatism" of the British courts. In England, moreover, the custom has rightly been to use scientific methods—e.g., comparison of finger-prints—as a means of detection rather than the basis for a verdict. But in Germany the use of blood groups in forensic medicine has engaged the lively attention of jurists and medical men. The attitude to be adopted by the German Bar was discussed not long ago in the Berlin Legal Society, and the sense of the meeting was summed up by Judge LEONHARD, President of the Prussian Court of Appeal, to the effect that until as a result of scientific research the knowledge and understanding of the blood groups and their mode of inheritance has been placed beyond all doubt, evidence based upon them cannot be regarded as demonstrating the "manifest impossibility" (offenbare Unmöglichkeit) of paternity. Until this has been done, he said, such evidence cannot overrule the aphorism "Vater ist, wer der Mutter während der Empfängniszeit beigewohnt hat." Though both the Prussian and Austrian courts are willing to admit as evidence facts bearing upon the blood groups of the parties involved, it has been laid down in Prussia that "the impossibility of fatherhood cannot be legally regarded as being established absolutely (einwandfrei) by a blood examination." In Austria the ruling has been made by the Supreme Medical Council that "in the majority of cases the results of blood examinations will not assist in the establishment of paternity"; but nothing is said about the value to be attached to the evidence afforded by the blood groups in that minority of cases in which the tests point clearly to non-paternity. Thus the tendency of the lawyers, by no means unnatural, is evidently to thrust the onus of incontrovertible proof upon the biologists, and their challenge is taken up by 16 professors and heads of departments who contribute to a symposium in the *Deutsche Medizinische Wochenschrift*.[2] All 16 agree absolutely that the general facts concerning the constitution and inheritance of the groups are fully established, and several report cases in which blood tests have been admitted by the courts and have played an important part in the solution of legal problems. Thus Prof. ZIEMKE, of Kiel, mentions a case in which a woman accused a man of the paternity of her child; unfortunately for herself she happened to select as her child's father a man whose blood formula rendered his paternity impossible; she was found guilty of perjury and sentenced to six months' imprisonment.[3] Prof. TOBBEN, of Münster, quoted two cases in which alleged fathers were found to have blood groups inconsistent with paternity of their supposed children and were consequently relieved of the charge of maintenance.

Several contributors comment upon the need for extreme care in making the tests, and insist that examination should always be by microscope and that the test serum shall be allowed to stand for several hours, or even overnight, in contact with the red cells to be tested. No mention is made of adsorption tests, though in certain cases the agglutinogen titre of red cells may be so low as only to be demonstrable by removal of the homologous agglutinin from serum of the opposite group or of Group O by the use of large masses of cells. The question of providing and maintaining stocks of known sera of Groups A and B is not discussed. This is bound to assume great importance in the near future, and it seems desirable that there should be in this country a roster of persons proved to be of Groups A and B and available as sources of grouping sera. Such persons are known to the heads and directors of many laboratories throughout the country, and their bloods ought to be tested in every way possible, both in this country and abroad, in order that international standards may be established and maintained. The Health Commission of the League of Nations has just expressed its opinion that the standard sera in use in various countries should be compared by the Danish State Serum Institute, acting as the central laboratory of the League's Health Organisation, with a view to the adoption of such standards. It has further recommended that comparative experiments should be made in regard to the preparation, conservation, and titration of test sera, and also of the methods of determining the groups, and has expressed its satisfaction that the terminology outlined above, by which the groups are called A, B, AB, and O, has met with general approval.

[1] See THE LANCET, 1928, i., 1182.

[2] Deut. Med. Woch., July 27th, p. 1240, and August 3rd, p. 1285.

[3] See THE LANCET, 1927, ii., 1257.

Summer Time, which began on April 22nd, will cease on Sunday next, Oct. 7th, at 3 A.M., when the clock will be put back to 2 A.M. The hour 2–3 A.M. Summer Time will thus be followed by the hour 2–3 A.M. Greenwich time.

Annotations.

"Ne quid nimis."

THE DENTAL BOARD IN IRELAND.

THE official position of dental practice in the Irish Free State is now being cleared up. With the passing of the Order in Council on July 14th, 1922, Southern Ireland ceased to exist as far as the Dental Board of the United Kingdom was concerned, although happily this did not affect the right and duty of representatives from the Free State to sit upon the Board. The Medical and Dentists Acts Amendment Act passed last year validated the action of the Dental Board during the interregnum. Our Dublin Correspondent informs us that steps are now in progress for the formation of a separate Dental Board, as provided for by the Dentists Act of the Irish Free State. The Medical Registration Council has nominated three members as required by the Act. Although no restriction is laid by law on the Council in its choice of nominees, it has, as was expected, nominated three of its own body—namely, President D. J. Coffey, Prof. A. F. Dixon, and Mr. R. C. B. Maunsell. The overlapping of the Medical Registration Council and the Dental Board as regards membership ought to render easier the coöperation which is so desirable. Having received the nominations made by the Medical Council the Executive Council of the Irish Free State proceeded to make its nomination. Its choice fell on Dr. D. L. Kelly, one of the medical inspectors of the Department of Local Government and Public Health. It now falls to this body of nominated members to carry out the election of the elected members and thereby complete the Board. Two members are to be elected by registered dentists resident in the Irish Free State who are registered or were formerly registered in the General Dentists Register under Section 3 of the Dentists Act, 1921. Four members are to be elected by the registered dentists resident in the Irish Free State who are registered or were formerly registered in the General Dentists Register otherwise than under Section 3 of the Dentists Act, 1921. The compiling of a list of electors for the two elections will be a difficult matter, as many dentists have allowed their names to disappear from the General Dentists Register during recent years when there have been no laws governing dental registration in the Irish Free State.

HEAT REGULATION AND THE THYROID-ADRENAL APPARATUS.

THE progress of physiology makes it more and more clear that the finer mechanisms of bodily functions are under the control of the glands of internal secretion. Vitalistic theories and a priori assumptions must give way to experimentally verified explanations of a chemico-physical nature. It is true that such explanations can only be proximate, the ultimate nature of life-phenomena being hidden, but it is only by attempts to furnish them that an insight into the pathology of disease can be obtained. At the same time it must constantly be kept in mind that the body is not a multipartite system with physiologically separated influences in play, but a coördinated unit which is the resultant of many components, each of which, mathematically expressed, is a function of the remainder. Dr. W. Cramer in a recent publication [1] points out that in regard to the body's regulation of its heat production and heat loss such sterile conceptions as "heat centre" must give way to rational conclusions based on experiment. The components entering into the regulation of heat are the sympathetic nervous system and the thyroid and adrenal glands; the conditions of fever are fixed by the actions and interactions of these glands and their effects on the sympathetic system. By carefully worked-out histochemical methods the functional activity of the adrenal has been studied by Dr. Cramer, special attention being paid to the condition of the medullary adrenalin "granules" and the cortical lipoid. One important result of this study has been to show that a functional unity exists between the medulla and the cortex, the active secretion of adrenalin being accompanied by definite changes in the cortical lipoid. Dr. Cramer further shows that agents which stimulate or inhibit the secretory activity of the adrenal produce similar effects in the thyroid. The whole mechanism of heat control is under the influence of the sympathetic, both the physical factors, such as sweat glands, calibre of peripheral vessels, arrectores pilorum, and so forth, and the chemical factor arising in the carbohydrate liberated from the liver. He demonstrates that all these factors are profoundly affected by the thyroid-adrenal apparatus, and in fact reaches the conclusion that "the thyroid and adrenal glands represent an endocrine apparatus for the heat regulation of the body." That no mention is made of the pituitary must be intentional, but most observers hold that this gland exerts a definite influence on carbohydrate metabolism and hence on heat regulation. A particularly interesting and stimulating section of Dr. Cramer's work is that dealing with the glycogenic function of the liver. The so-called storage theory is strongly attacked, the main point at issue being whether glycogen is a passive store of carbohydrate or whether it is, as Claude Bernard long ago declared it to be, of the nature of an internal secretion. The latter view has been advocated, among others, by E. P. Cathcart and J. Markowitz; Dr. Cramer has reviewed the evidence supporting it and has presented it with force. The distinction is essentially between a static and dynamic theory of glycogenic function. One striking outcome of this concept is that diabetes and other conditions associated with high and delayed blood sugar curves, hitherto regarded as due to diminished glycogenic function, become examples of an increased glycogenic function. Further, the thyroid and adrenal secretions must be regarded as increasing and insulin as inhibiting liver activity. Dr. Cramer is to be congratulated on producing a work which will be a constant stimulus to further research.

[1] Fever, Heat Regulation, Climate and the Thyroid-Adrenal Apparatus. By W. Cramer, D.Sc., Imperial Cancer Research Fund. London: Longmans, Green and Co., Ltd. Pp. 153. 15s.

THE QUEEN ALEXANDRA SANATORIUM FUND.

ONE of the minor tragedies of the war was the closing down of the sanatorium in Davos which realised the dream of the late Lord Balfour of Burleigh to collect under one roof all the British patients visiting that upland valley for their health. Ever since John Addington Symonds, acting in defiance of his London consultant, demonstrated the possibility of wintering in the Alps, the valley of Davos had been visited by an increasing number of British patients for reasons of health or recreation or judicious combination of both, and one may conjecture what might have been the gain to literature if such distinguished poitrinaires as R. L. Stevenson and Mrs. Oliphant had been able to enjoy the care and supervision of a British sanatorium. Its erection was the crowning act in the life of that great clinician, Dr. W. R. Huggard, who directed almost where every stone should be laid, and the sanatorium when complete superseded the English Home where a certain number of assisted patients lived together. After a few highly successful years the Queen Alexandra Sanatorium shut its doors in the autumn of 1914, when the journey across France became impracticable, and the alteration of money values made it impossible to reopen when peaceful conditions returned. The tragedy, however, is relieved by the fact that the good work of the foundation has not been entirely suspended, for the money realised from the sale of the building has inaugurated a fund, held by the Official Trustees, which still helps tuberculous patients of small means to obtain treatment in Switzerland. During the year

ended April 30th last, on which a report has just been issued, 44 patients of a "type and quality" commended in the report, were assisted, all of whom would have been unable to enjoy the benefit of Alpine treatment without this help. The report, however, laments the large proportion in this last year of short-time patients. The possible number of days that a patient can be under Alpine treatment in accordance with the scheme is 198, but this figure was only reached by seven patients, and there were only 18 who spent over 180 days in Davos. Patients who come out late and go away early do not get the benefit of the full winter's treatment which it is the object of the Fund to give, and the promoters take the opportunity of bringing this fact once more before the notice of the practitioners in this country on whom the onus rests. For the information of those who may still wish to make recommendations this year it may be added that grants are made at the rate of £2 (50 Swiss francs) a week to selected cases, the grant being given for a period covering the late autumn, winter, and early spring, and being conditional on the recipient staying at an approved sanatorium or pension at Davos. Applications should include a statement of financial means, a report from the family doctor, and a certificate of medical suitability from one of the honorary examining physicians to the Fund. Successful candidates are required to go out to Switzerland without delay and to stay there for the whole of the winter unless prevented by some urgent and unforeseen cause. If the patient does not elect to stay at a sanatorium where there is a resident medical man, he must place himself under one of the Fund's visiting physicians at Davos. The question, how much does it cost for a patient to live at Davos through the winter, is answered in the report by the statement that a British patient of the class for whom the Fund is intended will probably require not less than £5 a week—that is to say, £3 a week in addition to the grant of £2—which would cover everything except the journeys to and fro, and guarantee the degree of comfort desirable to give the venture its fair chance of success. Once again it should be remarked that grants are only made to persons in an early stage of the disease. The hon. secretary of the Fund, to whom applications should be addressed, is Mr. David Vesey, 97, Warwick-road, London, S.W. 5.

EPIDIDYMITIS.

EPIDIDYMITIS attributable neither to the gonococcus nor to the tubercle bacillus is not infrequent, and its diagnosis and treatment occasion considerable difficulties to the practitioner. The organisms usually responsible are staphylococci, streptococci, and the colon bacilli. More rarely the *B. mucosus capsulatus* of Friedländer and the *Micrococcus catarrhalis* have been found. Clinically the epididymitis may resemble the gonorrhœal and tuberculous varieties in that it may be either acute or chronic in its commencement. The fact that there is no urethral discharge makes the differential diagnosis from tuberculous epididymitis difficult, and it is not surprising that in many cases mistakes occur. Dr. Meredith F. Campbell[1] quotes with approval the conclusions arrived at by A. R. Stevens—that if the epididymitis is of less than one month's duration bilateral involvement favours tuberculosis; if it is associated with a sinus of over one month's duration the infection is probably tuberculous. This probability is increased if there exists clinical tubercle elsewhere in the body or marked lesions of the prostate and seminal vesicles. As an aid to diagnosis Dr. Campbell recommends the use of small doses of tuberculin which will cause a reaction only in a tuberculous case. Treatment consists of rest and careful immobilisation of the scrotal contents by means of the special suspensory bandage in use at the Bellevue Hospital. About one in four cases requires operation, which may be either epididymotomy or epididymectomy. The method of epididymotomy used by Dr. Campbell is that advocated by F. R. Hagner—namely, exposure of the testicle and multiple puncture of the epididymis with the blunt end of a Hagedorn needle. That early and thorough surgical elimination is indicated is proved by the fact that of the 79 cases of non-tuberculous non-gonococcal epididymitis collected by Dr. Campbell a third eventually lost the testicle by suppuration. To the same number of the journal Dr. Ernest Rupel contributes an article on the use of calcium chloride in the treatment of epididymitis. It is based on clinical observations made while treating cases of non-tuberculous epididymitis (both gonococcal and due to pyogenic organisms), 50 being treated by ordinary methods and 28 by these methods supplemented by intravenous injections of calcium chloride. The calcium chloride was given in doses of 0·5 g. to 1 g. in dilute solution. In most of the cases receiving intravenous injections prompt relief from pain was noted. Sometimes the relief was only temporary, but when pain recurred it generally yielded to a second injection. In 8 of the 22 patients treated one injection was sufficient. In the remaining 14 an average of 3·5 injections was required. Without being able to explain the reasons for the clinical results obtained the author expresses conviction that the injections not only relieved the patient's symptoms, but actually cut short the duration of his attack. The fact that the calcium injected was eliminated rapidly from the blood stream makes it quite likely that the determining agent will be found to be the calcium within the tissues or perhaps some new body produced through a tissue change. As no harmful effects have been noted from this form of treatment it is certainly worthy of wider trial.

[1] Amer. Jour. Med. Sci., September, 1928.

THE THERAPEUTICS OF INTESTINAL AMŒBIASIS.

IN therapeutics a periodic stocktaking may be a chastening experience. After probing the literature on the therapeutics of amœbic dysentery published during the last 30 years R. Knowles[1] and three colleagues have constructed a graph to illustrate the rise and fall in popularity of various specifics during the first quarter of the twentieth century. The early years witnessed the era of ipecacuanha which was followed by a minor, but ill-directed, wave of enthusiasm for ipecac sine emetine; hard on its heels (1912) came the work of Leonard Rogers and the introduction of emetine, which still remains in popular favour. In succeeding years emetine-bismuth-iodide, yatren, and stovarsol have to some extent replaced the older remedies. To determine the claims to serious consideration of the various methods the workers proceed to analyse the results of treatment of 154 patients. These patients, who were under the care of different professors and research workers at the Calcutta School of Tropical Medicine, received in all 220 treatments, and the results afford a basis of comparison with those obtained in other institutes. The decision as to when a real and permanent cure of such a chronic, latent, and insidious disease has been obtained is not easy to make. To follow up native patients is very difficult and even from Europeans it is almost impossible to obtain specimens of fæces for microscopical examination week by week, after the cessation of treatment. Occasionally a careful patient, interested in his own case, can be induced to send a specimen once a week for eight weeks, but such patients are rare. Moreover, even a negative parasitological test is not an absolute indication of a permanent cure. In our view the only real test is to follow up the clinical history of the patient for at least a year after treatment has been discontinued.

Of the various specifics the authors discuss first alcresta ipecac (Lilly and Co.). Of the seven patients treated with this drug three were possibly successful and four were failures—an unsatisfactory result. Thirty-two patients were treated by injections of

[1] Indian Medical Gazette, August, 1928.

emetine only; of these the ratio of probable cures to failures is 6 : 10, which is even less satisfactory than the results with alcresta ipecac. Fifty-five patients were treated by injections of emetine plus the administration of large doses of bismuth orally (Deek's treatment). Of these only 30 could be followed up. The ratio of probable cures to failures worked out at 9 : 16, a figure slightly worse than for emetine alone. Twenty-three received the emetine-bismuth-iodide treatment, and the ratio of probable cures to failures worked out at 1 : 3·5, a very low figure, although it is remarked that certain individual patients tolerate the treatment better than others and there are some remarkably good results. Of the more recently introduced yatren treatment the authors speak less favourably than do certain other observers. With the oral treatment they treated 23 cases and again some striking clinical successes were obtained, probably caused by irritation of the colon and subsequent eradication of the infection. The ratio of probable cures to failures is 1 : 1·3, a figure similar to that obtained with alcresta ipecac. Only six patients have been treated by the combined yatren therapy (oral and rectal); the ratio of probable cures to failures is 1 : 1·5. This treatment was reserved for very intractable cases, the high cost of the treatment militating against its more universal employment in India. The action of stovarsol, much lauded by French writers, was investigated in 32 patients, and the ratio of probable cures to failures of 1 : 1·1 obtained, a relatively high figure which has confirmed the position of stovarsol in the treatment of chronic amœbiasis. If given in larger doses than 0·25 g. t.d.s. the drug may exert a toxic action. Probably stovarsol is best employed in the after-treatment of amœbic dysentery. Sixteen cases were treated orally with kurchi (*Holarrhena antidysenterica*) in tablet form. The ratio of probable cures to failures was 1 : 1·1, a surprisingly high figure for so simple a remedy.

The possibility of combined treatments merits attention. Emetine with kurchi gave poor results, emetine with stovarsol was more encouraging, while the combination of emetine and yatren or E.B.I. and yatren still await extensive trial. These findings, together with the study of the previous literature, have led these workers to conclude that all these drugs are amœbicides, but weak ones.

AN OUTBREAK OF POLIOMYELITIS.

IN his annual report for 1927 Dr. W. Allen Daley, medical officer of health for Hull, gives an account of the epidemic of poliomyelitis which occurred in that city from July to September. In the years up to and including 1926 the average annual number of notifications of this disease was only 1·5, but this obviously did not give a complete account, as 104 cases of infantile paralysis in children under the age of 16 were known to the department, and in 24 of these the children were under 5 years of age. They, however, were sporadic cases. In March, 1927, there was one notification; there was a second on August 2nd; and a third and fourth on the 15th and 16th; and it gradually became evident that an epidemic was prevailing. A circular on August 29th to the medical practitioners produced further notifications, and the lag between onset and notification became gradually less. It was found that ten patients had developed the disease in the month of July. By the end of the year 111 cases had been notified, in two of which the condition was called polio-encephalitis. The age-incidence of 110 cases was as follows:—

Under 1 year of age	.. .. ..	11 (one fatal)
1 to 2 years of age	.. .. ..	18
2 „ 5 „ „	.. .. ..	46
5 „ 10 „ „	.. .. ..	19
10 „ 15 „ „	.. .. ..	7 (one fatal)
15 „ 20 „ „	.. .. ..	5 (two „)
20 „ 30 „ „	.. .. ..	2 (one „)
Over 30 „ „	.. .. ..	2 („ „)

In all only six of the patients died, one of them being a child of 9 months and the others over 10 years of age. There was, however, in July an unusual mortality—certificated as tuberculous meningitis—and it is thought that some of the deaths attributed to this cause were really due to polio-encephalitis. The disease attacked indifferently all social classes. As regards case-to-case infection, there was one instance of two brothers being attacked; another instance of a father and son; and a third instance in which three children from neighbouring houses played together and were infected. There was a further case of a Hull child at a seaside resort, one of whose playfellows from Liverpool subsequently died from poliomyelitis. It was not easy to say whether there were many abortive cases. Only eight of the 111 notified had no paralysis.

The city hospital admitted 55 of the patients, and other hospitals five. By way of treatment hexamine was at first given as a routine, but its use was abandoned later owing to the risk it involved to the kidneys and because no benefit was observed from its administration. Lumbar puncture was used both for treatment and diagnosis and in four cases serum from a convalescent patient, aged 27, was thought to have improved the condition of those who received it. All the patients had the advantage of after-treatment through a clinic conducted by the orthopædic surgeon, Mr. R. B. Blair. Forty-nine of the patients were given artificial light and, it was thought, were the better for it. Of those who survived the illness, 8 had no paralysis, 18 have since recovered, 28 have much improved, and 8 are stationary. In 43 some permanent paralysis will probably remain.

A "REST PAUSE" FOR THE TIRED WOMAN.

THE tired professional woman—and in this class we include the zealous house-wife—usually has two good reasons for refusing to take the rest prescribed for her. The first is that she cannot leave her work, and the second that she has nowhere to go to. The first excuse may be merely a rationalisation, but in any case if her condition of true neurasthenia is neglected it soon ceases to carry weight, because she becomes patently useless even as a cog in an organised machine, certainly as its motive power. There remains the difficult task of finding her a temporary haven where her irritable nerves can be soothed and her confidence in her ability to cope with life restored. Most nursing homes are unsuited for this treatment, partly because they are equipped and staffed to deal with acute emergencies rather than chronic conditions, and the overhead expenses are therefore too great to admit of low fees. Moreover, unless they cater for definitely mental patients they are rarely so planned that patients can live and have their meals in bed, in the garden, or in their rooms at choice, according to the whim of the moment. The salient feature of the rest home recently opened at Backsettown, Henfield, Sussex, is the recognition of the need for solitude, quiet, and complete freedom from responsibility if the patient is to recover poise and mental vigour with the least possible delay, and to maintain a healed mental attitude when she returns to normal life. The aim of the promoters of this scheme is to supply a "rest pause," under special conditions, to the efficient whose activities are threatened or impaired by the stress of modern life. Backsettown is not a convalescent home in the accepted sense of the word. It is primarily intended for the use of (1) overworked professional women; (2) women with arduous social and public obligations; and (3) mothers of families and others with heavy domestic responsibilities. Infectious, borderline, and mental cases are ineligible. The treatment offered consists of rest in congenial surroundings, also good cooking, a diet rich in vitamins, and ultra-violet radiation where needed. There is a resident fully trained matron, and the establishment is under the supervision of Dr. Octavia Wilberforce and Dr. Marjorie Hubert. The house can accommodate eight patients; the management is vested in the hands of a small executive committee, and any profits that accrue will be used for

purposes of extension. The fees charged are from £4 4s. to £8 8s. weekly according to the size of the room, and a week-end's rest when a room is available need cost only £1 5s. These charges do not include doctors' fees, which are a matter of independent arrangement. We have taken an opportunity of inspecting this home. Although within six minutes of post and telegraph, Backsettown is completely sheltered from sight or sound of traffic. The older part of the house dates from the fourteenth century, the newer part having been added in 1774. The oak beamed rooms, the lovely garden, protected by trees from north-easterly winds, and the cleverly-planned bed-sitting rooms with hot and cold water laid on, give an impression of comfort and reassurance. The rooms are light and sunny, and the furniture and hangings delightful. Electric light and central heating have been installed without spoiling the old world character of the place. The hon. secretary of the home is Miss Evelyn Fellows, 15, Eaton-gardens, Hove, to whom applications for admission should be made, accompanied, when possible, by a letter from the patient's medical adviser.

DISINFECTION BY ANTISEPTIC SPRAYS.

THE sight of someone spraying an antiseptic solution into the air in order to prevent the spread of infection must often have raised a tolerant smile on the faces of enlightened members of our profession. The process has generally been regarded as no more than an innocuous placebo. But evidence is now forthcoming from the National Institute for Medical Research [1] which will certainly shake this complacency. The investigators began by heavily charging the air with *Bacillus coli communis*, an emulsion of which was sprayed into the blast of a powerful electric fan. Later some culture plates were exposed for two minutes and incubated overnight, after which the colonies were counted. It was found that the number of colonies was greatly reduced if, before the plates were exposed, an operator, using a cheap but effective spray, had walked round the room slowly spraying an antiseptic at the rate of about one stroke of the piston per second. Two antiseptics were used and both were effective; but one of them, composed of electrolysed sea-water with about 1 per cent. of available chlorine, was of quite remarkable potency when freshly prepared. The authors of this investigation conclude that the use of an antiseptic spray in crowded workrooms, offices, and theatres is justified, though it is true that the amount used in their experiments was relatively large and might be objectionable in industrial life. When we remember how much time and efficiency are lost as a result of infectious catarrhs, it becomes evident that a small expenditure on this means of prevention might repay employers of labour.

THE TRAINING OF CIVIL DOCTORS FOR WAR SERVICE.

WHEN the United States declared war on Germany and decided to raise an army it was obvious that a medical organisation must be at once prepared to examine recruits, treat the sick, and tackle the problems of hygiene. Medical organisation camps were forthwith set up for training the civil practitioners on whom these duties would fall. The chief of them was Camp Greenleaf, near Chickamauga, Georgia, which continued to grow until the end of the war, when it held between 20,000 and 30,000 men—officers and other ranks of the Medical Corps. The medical practitioners had to be examined and graded, and were thereupon trained in all sorts of useful subjects, including administration, anatomy, French, practical surgery, psychology, and radiology. The main difficulty at first was to select and train instructors; the next was to find lecture rooms. "Other ranks" were trained to realise that theirs was the most vital work being done in the army, and were thus encouraged to make their best efforts. The results of this education were good, and for officers the process was continued in France, where they received lectures and pamphlets by various medical authorities. Many of these are reproduced in Volume VII. of the official history,[1] which has just been issued. They include Colonel B. K. Ashford's description of conditions in the front trenches, Captain H. L. Sanford on prophylaxis for venereal disease, Major G. W. Crile on shock, Brig.-General W. S. Thayer on military work for physicians, and General Cuthbert Wallace and Dr. Lemaître on war surgery. Another means of instruction was to send round parties to learn what they could from the Allies in the trenches, and in hospitals, laundries, and the like. A careful study of the work this book describes and of the programmes it contains for courses would undoubtedly be of assistance in the quick development of an expert military medical service on another occasion. There are a few defects in editing; thus, "Harrock" (p. 669) and "Horrick" (p. 712) should have been "Horrocks," and the Soyer stove (p. 704) is of French, not German, origin, but the book is a great record of the foresight and energy of the medical profession in the United States during the late war.

WE regret to announce the death of Dr. Diarmid Noel Paton, F.R.S., at the age of 70, shortly after his retirement from the Regius Chair of Physiology in the University of Glasgow.

WE announce elsewhere that the Semon Lecture of the University of London is to be given this autumn by Dr. Markusz Hajek, professor of oto-rhino-laryngology in the University of Vienna. The subject will be Laryngo-Rhinology and General Medicine, and the lecture will be delivered in the Barnes Hall of the Royal Society of Medicine at 5 P.M. on Thursday, Nov. 1st.

Two important donations have been announced during the week. At the Middlesex Hospital Dinner on Tuesday Prince Arthur of Connaught referred to a gift of £125,000 by Lord Woolavington for the establishment of a block for paying patients, and on Monday, the retiring vice-chancellor of the University of Cambridge said that an offer of £700,000 had been received from the International Education Board of the Rockefeller Foundation, chiefly for the development of facilities for physical and biological studies. This offer is conditional upon the sum of £229,000 being raised by the university.

THE Royal Society of Medicine opened its new session on Oct. 1st under the presidency of Lord Dawson of Penn. The annual dinner is to be held on Thursday, Nov. 15th, at 7.30 for 8 P.M., at the Mayfair Hotel, Berkeley-street, W., and this year the principal guests will be Mr. Winston Churchill and Mr. Rudyard Kipling, both of whom have promised to speak. A fortnight later, on the evening of Nov. 29th, Sir William Bragg will deliver the Lloyd Roberts Lecture at the Society's house in Wimpole-street, taking Faraday's Diary, which is as yet unpublished, as his subject. The lecture will be preceded by a reception, when some of Faraday's original apparatus and also pages from his diary will be on view. Tickets of admission will be required, and application for these should be made to the Secretary.

[1] The Effect of Antiseptic Sprays on the Bacterial Content of Air. By S. R. Douglas, L. Hill, and Wilson Smith. Jour. Indust. Hyg., September, 1928, pp. 219–26.

[1] The Medical Department of the United States Army in the World War. Vol. vii., Training. Washington: Government Printing Office. 1927. Pp. 1211. $3.25.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

VI.—THE INTERPRETATION OF REPORTS ON THE CEREBRO-SPINAL FLUID.

By J. G. GREENFIELD, M.D. EDIN., F.R.C.P. LOND.,
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I.*—THE PRACTITIONER'S RESULTS.

THE examination of the cerebro-spinal fluid is now generally recognised as being of the greatest importance in the diagnosis of cases of organic disease of the nervous system. Sometimes this examination by itself enables an exact diagnosis to be made; more often it serves to indicate which of two or more possible causes is the basis of the symptoms exhibited.

The Collection of the Specimen.

The examination should, for the patient's sake, only be made once, except in cases which may benefit by the repeated withdrawal of cerebro-spinal fluid. It should therefore be as complete as possible, and to this end the clinician as well as the pathologist must contribute. Complete asepsis is the first essential, and this applies as much to the collection of fluid as to the operation of lumbar puncture. A contaminated fluid soon changes in character and becomes worthless for diagnosis. Cells and sugar disappear, protein alters, and the fluid gives a fallacious Wassermann reaction. The tube in which it is received must therefore be as sterile as the lumbar puncture needle. Chemical cleanliness is almost as essential. Even the "fur" deposited by boiling instruments and tubes in hard water may upset some of the tests. Whenever possible distilled water should be used, but water which has been boiled will serve. Attention should also be given to the tube used for the collection. It must be strong enough to withstand the risk of breakage in transit to the laboratory, and should be well stoppered, preferably with rubber or glass. Corks are at best dirty and are apt to form a collecting ground for cells and coagulum.

The amount of fluid to be taken depends partly on the case, and partly on the pathologist. In my experience it is not possible to make a satisfactory examination with less than 5 c.cm. and it is unnecessary to have more than 10 c.cm. even when the quantitative chemical examination is to include glucose, chlorides, urea, and protein. In cases of meningitis or uræmia in which drainage of fluid is beneficial a larger amount will be a convenience to the pathologist. Therefore if the tubes are marked with a diamond at the levels of 5 and 10 c.cm. it is easy to steer a course between incomplete examination and excessive drainage of fluid.

The Determination of Pressure.

The manometric pressure of the fluid is of such importance that its estimation has become a routine procedure to many neurologists. It is true that an attempt to read the pressure rather complicates the operation of lumbar puncture, but the information it gives is often of the greatest value and can be obtained in no other way. This is especially true in cases of cerebral and spinal tumour where the diagnosis may sometimes be made from the pressure readings alone or from phenomena which are observed in the course of the examination, such as pain at the site of the tumour on jugular compression. It cannot be too strongly emphasised that the rate at which drops of fluid escape on lumbar puncture gives at best a fallacious and at times an altogether erroneous estimate of the fluid pressure. A simple manometric lumbar puncture needle which can easily be used single handed was described in THE LANCET two years ago (1926, i., 1208). It is generally agreed that in this as in many other clinical examinations, the routine use of the method in normal cases renders abnormal readings more obvious and more convincing by making the limits of the normal more precise; the manometer should not therefore be reserved for the rare cases of cerebral or spinal tumour, but should be used in all cases where lumbar puncture is performed.

In taking a manometric reading it is essential that the patient should be lying on his side with the head at the level of the lumbar spine; he should be breathing easily with his muscles relaxed. Often at first the pressure rises slightly above the normal, but with the patient lying quietly and comfortably it falls in a minute or so to a steady level which is taken as the "initial pressure." Meanwhile the operator notes the dancing of the fluid with the arterial pulse and the slower but rather wider movements which occur with respirations. Normal pressures vary between 100 and 200 mm. of fluid. Pressures above 200 mm., if they cannot be attributed to embarrassment of respiration as in stout or nervous patients, indicate *increased intracranial pressure*. This may be due to cerebral tumour, œdema, or hæmorrhage, or to excess of fluid, as in meningitis or hydrocephalus. It is sometimes possible to distinguish cases of hydrocephalus from those of cerebral tumour or œdema by the observation that in the latter the pressure falls much more rapidly with the withdrawal of fluid. Thus after 3 or 5 c.cm. of fluid have been removed the pressure may have dropped to two-thirds or half of the initial pressure. In hydrocephalus, on the other hand, so small an amount of drainage produces little reduction of the fluid pressure. It is my rule never to reduce the pressure below two-thirds of the initial pressure, and although quite arbitrary this rule has so far stood the test of experience. The use of a manometer is therefore to some extent a safeguard, especially in cases of cerebral tumour, against the risk of too rapid and too great lowering of intracranial tension. Abnormally low pressures are sometimes encountered, but their significance has not yet been ascertained.

In cases of suspected spinal compression the "Queckenstedt test" is of great value. This consists in getting an assistant to compress the veins of the neck on both sides at first lightly and then if necessary more deeply. Normally even light compression causes the fluid to rise rapidly in the manometer tube, falling as suddenly when the pressure is removed. But when the space between dura mater and spinal cord is narrowed or obliterated by tumour or spinal caries or even by meningeal adhesions there is no rise of fluid in the manometer on light pressure and only a sluggish rise followed by an equally sluggish fall results on deeper pressure. Often the fluid does not return completely to the original level, or after rising slowly it may not fall at all when the pressure is relaxed. The latter phenomenon is practically diagnostic of a meningeal tumour. It appears to be due to the ball valve effect of a tumour in the spinal canal, and may be associated with an abnormally high initial pressure. In cases of complete blockage of the spinal canal the deepest jugular compression that the patient can stand fails to cause any rise of fluid in the manometer tube.

Naked-eye Examination of the Fluid.

Yellow coloration, however slight, is abnormal and indicates either pre-existing hæmorrhage or excess of protein or both. The formation of a *coagulum* on standing is also a valuable indication. In a clear colourless fluid it is characteristic of meningitis, especially the tuberculous and syphilitic forms, or of poliomyelitis. When occurring in a yellowish fluid it indicates considerable excess of protein along with some cell increase.

* Part II.—The Pathologist's Results—will appear next week.

Turbidity may be due to pus cells or to red blood corpuscles. These are sometimes not easily distinguished at first sight, but the colour of the deposit after the fluid has stood will indicate which of the two is present. A turbidity which does not clear on standing or even after centrifugalisation is probably due to the presence of micro-organisms; this condition is occasionally encountered in fulminant cases of pneumococcal meningitis.

Blood admixture may be due either to pre-existing subarachnoid hæmorrhage or to injury to a vessel by the lumbar puncture needle, and it is of the utmost importance to distinguish these two forms. If the blood admixture varies but little from the beginning to the end of the tap (or puncture), and more especially if the clear fluid, after the corpuscles have settled, is tinged with yellow, the diagnosis of pre-existing meningeal hæmorrhage is certain. If the upper fluid is colourless and the amount of blood admixture varies from the beginning to the end of the puncture it is evidence of accidental injury to a vessel and of no diagnostic significance. It is remarkable how often blood-stained fluids have been thrown away as useless or only examined for bacteria when a physico-chemical examination would have settled the diagnosis beyond question.

The information given by each of these various abnormalities is often much increased when two or more are combined. Thus the fact that a clear fluid which forms a cob-web coagulum on standing was removed at normal pressure may turn a possible diagnosis of tuberculous meningitis into the almost certain one of poliomyelitis. It is clear that only in special cases can a final diagnosis be reached at the bedside, but much presumptive evidence can often be gained, and this may serve as a guide to immediate treatment.

Some Examples.

A few examples drawn from experience in which the diagnosis was arrived at by observations made during the puncture will help to illustrate these points.

CASE 1.—A lady with slowly ingravescent paraplegic symptoms complained that one of her chief troubles was pain running round one side of her trunk when she coughed. On lumbar puncture a yellow fluid rose slowly in the manometric tube, pulsating very slightly with the arterial pulse, and jumping slightly on coughing. Compression of the jugular veins, sufficiently deep to cause cyanosis of the face, produced no movement in the manometer. The fluid set in the tube into a firm jelly soon after it was drawn off (Froin's "massive coagulation"). The diagnosis of spinal tumour between the cord and the dura mater made at the time was confirmed a few days later by an operation at which the tumour was successfully removed.

CASE 2.—A lady between 50 and 60 years old found that her legs were becoming gradually more stiff. But her chief complaint was of a sharp shooting pain which ran round under her shoulder when she coughed. For this reason "she dreaded having a cold." On lumbar puncture the cerebro-spinal fluid rose rapidly in the manometer to a height of 250 mm. It showed good respiratory pulsations, but no arterial pulsations whatever. Light bilateral compression of the jugular veins caused no movement of the fluid in the manometer, but deep jugular pressure caused it to rise rather slowly to 280 mm. When the pressure was released it fell slowly and irregularly, but did not return to the original level. After the removal of 5 c.cm. the pressure fell to 150 mm. In this case the fluid was colourless and did not form a coagulum, but examination later showed the protein to be considerably above normal. This was a good example of the "ball-valve" effect of a meningeal tumour, the high initial pressure being due to the efforts which the patient had made in getting into position for the lumbar puncture. A meningeal tumour attached to one of the posterior roots at the upper thoracic level of the spinal cord was successfully removed a few days later.

CASE 3.—A child of 3 years had been ailing for about a week with vague symptoms which suggested a gastro-intestinal upset. She was querulous and inclined to be drowsy. On lumbar puncture the fluid, which was slightly yellow and formed a fine coagulum after withdrawal, rose at first very slowly, but gradually reached the high level of 310 mm. while the child lay quite comfortably and breathing easily. The diagnosis of cerebral mischief, either tumour or meningitis, was made at the time; the slowness of the rise suggested a meningitis which had caused some spinal meningeal adhesion, and subsequent examination of the fluid gave evidence of tuberculous meningitis.

CASE 4.—A lad of 20 had been ill for five days complaining of severe headache and stiffness of the neck which had come on gradually one evening. He had had no pyrexia at first, but during the last 36 hours before lumbar puncture was performed the temperature had risen twice to the neighbourhood of 100° F. On lumbar puncture the fluid was evenly blood stained and rose rapidly to over 300 mm. 25 c.cm. were removed after which the pressure was still 200 mm. The fluid as seen in the test-tubes was salmon pink, a yellowish tinge being apparent as well as the red colour due to blood admixture, and this yellow coloration became more evident as the corpuscles settled. A diagnosis of spontaneous subarachnoid hæmorrhage, probably due to rupture of an aneurysm on the circle of Willis, could therefore be made at once.

CASE 5.—A man of about 50 had for some weeks become increasingly drowsy and used to pass into periods of deep sleep from which it was difficult to rouse him. In one such comatose attack a lumbar puncture was performed. The fluid was clear and colourless and was at a pressure of 235 mm. After the removal of 5 c.cm. the pressure had dropped to 140 mm. and the patient wakened up and talked rationally. The diagnosis of cerebral tumour, which was made chiefly on this rapid drop in the pressure, was subsequently confirmed.

What to Demand from the Pathologist.

When a specimen of cerebro-spinal fluid is sent to a pathologist for examination it is advisable that he should be told as much about the clinical nature of the case as possible. This is much better than merely asking him to perform certain tests on it, as most pathologists nowadays are fully conversant with the examination of the cerebro-spinal fluid, and the decision as to the methods of examination to be employed should rest with them. But unless the clinical nature of the case is known some important examination may be omitted or left so late that insufficient fluid remains for the test. The more important lines of examination may, however, be indicated. These will depend on whether the case appears to be one of cerebral or spinal disease and on the acuteness of onset and course of the malady. In every case a total and differential cell count, and an examination for total protein and globulin excess should be made. Where there is any possibility of septic infection a cultural examination and an examination of stained films for organisms should be asked for; these examinations should be made as soon as possible after the fluid is obtained.

In the more acute cerebral conditions it is usually wise to make a fairly complete quantitative chemical examination including estimations of chlorides, glucose, and urea. In suspected meningitis also the chlorides and glucose should always be estimated, as the degree of reduction of these substances gives an indication of the severity of the disease. An estimation of the urea has often proved that cerebral symptoms were due to unsuspected uræmia, a condition in which there is usually also a rise in the chloride percentage. It is a well-established fact that the urea percentages are always identical in the blood and the cerebro-spinal fluid. Consequently the examination of the one makes that of the other unnecessary. In spinal lesions and in many of the more chronic cerebral conditions these chemical examinations are unnecessary, but a Wassermann reaction should almost always be performed and one of the colloidal reactions (gold, benzoin, paraffin, or mastic) may help to distinguish the type of syphilitic lesion or, in the presence of a negative Wassermann reaction, may indicate that the case is one of disseminated sclerosis.

The minimum examination therefore that may be considered complete in a spinal case or in a chronic cerebral case includes: (1) total and differential cell count (0·5 c.cm.); (2) estimation of total protein (1 to 2 c.cm.); (3) one or more tests for globulin excess (0·5 c.cm.); (4) Wassermann reaction (1 to 2 c.cm.); (5) a colloidal test (0·1 to 1 c.cm.). Thus 5 or 6 c.cm. of fluid are quite sufficient for all these examinations.

Opening of the Medical Schools.

PAST AND PRESENT.

An Address to Students of University College Hospital on Oct. 1st

BY SIR THOMAS BARLOW, BART., K.C.V.O., F.R.S.,
CONSULTING PHYSICIAN TO THE HOSPITAL.

DURING the last few months there has been celebrated with becoming dignity and moderate completeness the centenary of the University of London and of University College. On this, the opening day of the winter session of the medical department of this College, it has been judged fitting that I should refer to some of the salient points arising from the fact that the medical classes were started close by here just 100 years ago.

A century ago, although no doubt London was a great centre for medicine and surgery, education in these subjects was very poorly organised. There were four great hospitals—St. Bartholomew's, Guy's, St. Thomas's, and the London—and to these hospitals eminent physicians and surgeons were attached, part of whose duty was to give instruction to the students. There was a certain amount of ambulatory instruction, such as we should now call clinical teaching, given to the men who in the current phrase, "walked the hospitals"; but this was sometimes rather perfunctory. A physician to one of the four hospitals that I have mentioned, on entering his ward, found a number of students assembled with a view to accompanying him in his round. The physician was accustomed to place himself with back to the fire and wait until every student had disappeared; then he began his round.

The surgeons were better; they welcomed students to the operating theatres to behold the celerity and dexterity with which they got through operations such as the amputation of a limb. In those pre-anæsthetic days the chief interest was to note the number of seconds which were taken in the principal part of the operation. A number of surgical dresserships to in-patients were allotted. These posts were entirely in the gift of senior surgeons and were only held by their apprentices. Sometimes a heavy fee was exacted for such an appointment.

In those days a great portion of the medical teaching, especially in the early subjects, was carried on in private medical schools, which were the property of surgeons and occasionally of physicians. One of the most important was in Windmill-street and was the property of the celebrated John Hunter. Anatomy and physiology were the most important subjects, but at some of these schools medicine and surgery, botany, chemistry, and obstetrics were also taught.

These private medical schools have all vanished. One of the last of them still existed in this neighbourhood when I was a medical student more than 50 years ago, but it did not flourish. It was attended by idle fellows who had repeatedly failed at their examinations, but who by a process of cramming ultimately scraped through. It was a stigma in my day for any man to attend such a place. If you read the novels of Smollett and the later ones of Albert Smith and Charles Dickens, and look at Rowlandson's pictures of eighteenth century life, you may well conclude that the medical student of those times was not a cultured or attractive personality.

The Medical Faculty and Hospital of University College.

When our founders had erected the initial buildings of the University of London in this neighbourhood, one of their earliest problems was the organisation of the medical faculty. They founded no less than 11 professorships in medical subjects, and these chairs were filled by the appointment of 11 men, each one distinguished in his own subject. Each professor taught only his one subject with one exception. That was Sir Charles Bell, who for a time taught physiology as well as surgery. Within seven years of that date there were a few changes in the personnel of the professoriate, and then the greatest Roman of them all, William Sharpey, who came to us from Edinburgh, was appointed to the chair of physiology.

For 40 years Sharpey was a tower of strength to this College. He was not only an inspiring master in exposition and demonstration of his subject to many generations of students, but he was also a teacher of teachers to several of the London medical schools.

Our founders soon realised that no course of medical study could be complete unless it included opportunities for learning the signs of injury and disease as well as the proper methods of handling the injured and of treating the sick. They accordingly secured a house in George-street, close by, and besides opening an out-patient clinic, they provided a few beds where cases could be studied and treated. In this out-patient clinic our students were taught practical medicine by Dr. C. J. B. Williams and practical surgery by Sir Charles Bell. In a short time a great step was taken by arranging for our students to attend in the wards of Middlesex Hospital, and there also clinical instruction by the two distinguished men whom I have mentioned was given.

But our founders were not content until, with courage, faith, and enlightenment, they had built the central block of University College Hospital.

You will not forget that in a very real sense the hospital was the child of the College, and you will realise that this close link helped to maintain a scientific basis for the investigation and remedial work of the hospital. Thus was brought about by our founders the great work not only of constituting a faculty of medicine but of instituting a medical curriculum and of providing a liberal education in the science and art of medicine.

Development of Medical Work at the College.

I shall not take up your time by detailing the successive steps of the evolution of this school of medicine. They consisted essentially in making more and more facilities for gaining practical experience in every department. Let it be remembered that these new facilities were not carried out at the demand of the examining bodies, but on the contrary, after they were started, they acted as stimuli to the examining bodies to deepen and widen the requirements of medical education. It meant more laboratories and lecture rooms, more teacherships for practical work. The new work included especially pathology and its many divisions, and the appointment of Sir Robert Carswell as the first ad hoc professor of pathology gave the keynote.

Nor shall I trouble you with the complex changes in the University of London. Suffice it that the last step as far as we are concerned has been the separation, for the sake of convenience of the early medical studies which are still housed in the College from the later or hospital group of studies which now find their local habitation in the hospital itself and in the University College Hospital Medical School in a new building in University-street. On the still further development arising out of the complete rebuilding and enlargement of the hospital I cannot dwell, but I should like to emphasise the importance of the incorporation of the National Dental Hospital and School, the staff and students of which we welcome as our colleagues to-day; the auxiliary annexes of the finely equipped Hospital for Women's Diseases, and of the Royal Ear Hospital cannot be ignored, nor can the great increase of valuable resident and non-resident appointments and the increased opportunities for increased research and learning.

Advice to the New Student.

And now I can well imagine that anyone of you may say: "What advice can you give me as to the best way in which I can carry through the vital studies which I began to-day?"

Well, I assume that you, who are freshmen, intend to take the M.B. and, ultimately, the M.D. of the University of London, and that you propose to take in your stride the qualifying examinations of the Conjoint Board of the Royal Colleges of Physicians and Surgeons. The conjoint diploma will give you a qualification to practise; it will make you eligible to compete for resident hospital appointments, and it will prove invaluable as preparation and preliminary test for the more formidable examinations of the University of London.

You have studied the prospectus of medical studies and you fully realise that in your first winter your most important subjects are anatomy and physiology. In education for medicine, as in every scientific professional study, there are four things which you ought specially to cultivate. The first is *technique*. You must spare no pains to become neat-handed in dissection and experiment. Secondly, you must cultivate the faculty of rapid, accurate *observation* of salient points, gathering in as much detail as possible. Thirdly, you must specially cultivate that part of the faculty of memory which is concerned with *visualisation*. For example, you must acquire the power of summoning at any moment a mental vision of what you have yourself displayed in dissection, or what you have seen in the dissections made by your fellows. Fourthly, you must learn to record accurately and tersely what you have yourself dissected or what experiments you have yourself performed.

I should like to develop this in a little more detail. During your first month you will begin to attend your lectures on anatomy and physiology, and you will have to learn thoroughly the bones of the human skeleton. These you must recognise instantly in the dark as well as in the daylight—what the bone is, to which side of the body it belongs, the name and shape of every eminence and groove upon the surface. Observation requires not only cultivation of vision but of tactile sensibility. After a month or six weeks a "part" will be allotted to you for dissection, probably a limb, and now you have ample opportunity for the cultivation of the methods which I have enumerated. I cannot exaggerate the importance of your becoming a neat dissector. You will learn your anatomy much more quickly and you will find it helpful, not only during your studentship, but throughout your professional life.

A man who can sketch is at a great advantage in learning his anatomy, but the next best thing is to be able to make a good diagram, which shall show, not only the shape of the structures displayed, but their relations to adjacent parts.

As to the visualisation I cannot speak too forcibly of the advantage from conjuring up mental visions of the different stages of your dissection. On rising and on going to bed, and as you take your walks, you ought to recall all these mental pictures.

In regard to the fourth method, that of recording the output of your dissections, you will find the following plan simple and worthy of trial. Take a hint from commercial book-keeping. Procure a large-sized exercise book, which for simplicity call your day-book. Every night write down what you remember of the day's dissections, including copies of such diagrams as you have made; then, with the aid of your text-book, write on the opposite page the necessary omissions and corrections. I assure you that if you persevere with this simple method of record and correction you will improve your memory, facilitate your anatomical acquisitions, and lessen the drudgery of your work.

In your first term you are dependent in physiology on lectures and demonstrations by your professor. In your first summer term, however, in the class of practical physiology, you will have the opportunity of making such experiments under skilled guidance as are necessary. You can apply in your own way the same fundamental methods in their bearing on physiology as those which I have pointed out in regard to anatomy.

The Uses of Lectures.

I should like to say a word as to lectures *versus* text-books. The great authority of Dr. Johnson is quoted in disparagement of lectures, but Johnson had the wisdom to draw a distinction between lectures illustrated by experiments and those not so accompanied. I am quite convinced that in one's studies the combination of the use of text-books with lectures is the right one. The lecturer can give illustrations and additional explanations which are lacking in the text-book. He knows when emphasis is most necessary, and experience has taught him where the student is apt to go wrong or to forget the relative importance of facts or observations. Moreover, the student derives not only the benefit of emphasis but the association of the lecturer's personality with the subject he is teaching. The subject may not be presented so logically nor so consecutively as in the text-book, but actual illustrative experience is often of definite advantage. The truth is that both are helpful and you cannot afford to dispense with either. Demonstrations, and especially catachetical demonstrations, you must never neglect. Do not be afraid of a little gentle ridicule at your mistakes and those of your fellows. Such associations help to stamp bits of knowledge often indelibly in our memory.

I must say one word about the great danger of *slackness* in the first winter session. Men often conclude that because the same subjects reappear in the medical programme for the second and third years they can repair the half-heartedness of their first winter by harder work in the summer and second winter. It is a profound mistake; the work of every term has been carefully graded and the postponement of early examinations or your failure in them may severely handicap your whole career as a student.

Work in the Wards.

Now I will pass over the later work of your early studies. I assume that you have passed your early conjoint and second M.B. examinations. You are now ready at the beginning of your third winter to attend lectures on medicine and surgery and also to start your hospital work. You must be ready immediately to begin at the hospital the junior class of clinical medicine, and you must not omit a single meeting of this class. You will learn the elements of physical examination of the organs of the chest and abdomen in health and disease, and this is work which you will be following during a great part of your professional life. Within a month or six weeks you will receive your first hospital appointment as clinical clerk in the wards or in the out-patient room, either medical or surgical. The combination of ward and out-patient work under the same chief is, I am convinced, one of the most beneficial recent modifications of the medical curriculum.

Assuming that you get a medical clinical clerkship, you will take your instructions primarily from your house physician, and I advise you to become his humble and devoted slave. Seventy per cent. of what you learn in the medical wards comes from what you learn from him in the morning rounds. You will have, amongst other duties, to take histories of the cases allotted to you. Don't be too proud to correct omissions and blunders in your histories, and when writing under dictation the "present states" be sure to verify sooner or later the bearing of the physical signs which are dictated to you. In a few days your chief will make one of his regular clinical visits. There may be inevitable criticisms of history and "present state" and you may have to bear the brunt of question and criticism. Do not be afraid of asking for enlightenment, but don't be so foolish as to argue. I never forget occasions when Sir William Jenner had pretty well turned inside out a poor clinical clerk, and the clerk, humiliated and dismayed, received Sir William's kindly comfort: "My dear fellow, you will never forget this all through your life. It was with that object that I bothered you so with questions."

Some of your cases will die. Never omit a single post-mortem examination. In your private note-book enter as many details as you can remember. Write down your chief's clinical remarks, but especially note the mistakes that were made in the ward in the light of the post-mortem findings and if possible how those mistakes came to be made. When you have finished your junior clinical class and your clinical clerkship, you may be able to sandwich in a three months' post-mortem clerkship, and you ought about this time to make yourself thoroughly efficient in urine analysis and blood counting, &c., which really belong to your clinical clerkship.

The Importance of the Special Departments.

You cannot begin too soon to get thoroughly skilful in handling the instruments of special investigation—the laryngoscope, the ophthalmoscope, the otoscope, and the sphygmograph. If you begin early you will get many more chances of testing your efficiency in the successive clinical posts which you hold. If possible by all means get a clinical clerkship in the children's ward and try also to attend the infant clinic. Take as many opportunities as possible of attending the skin clinic. Besides becoming familiar with the different types of skin disease, you will find it an excellent supplement in the study of diathesis and associated diseases, and it is valuable for learning practical points in therapeutics. On no account miss your opportunities of attending demonstrations of fever at a fever hospital. It is absolutely imperative that you should be familiar with the naked-eye signs as well as the stages of the acute specifics.

You will during the next summer be taking lectures and practical pathology, and this is coördinated with your hospital work. I have said nothing about your surgical appointments; it is beyond my province, but I will say this, whilst you are doing your surgery you must give your heart and soul to it and at the same time keep your clinical medical knowledge in full working order. Remember that every surgical case gives opportunity for general clinical investigation.

You must not omit the opportunities which you get of demonstrations of typical cases of mental disease, and you must make yourself familiar with the thorny requirements of certification. I should also like to say that when the time comes for your obstetric lectures and subsequently for your practical midwifery, you will find that the care of midwifery cases is one of the very best preparations for your future practice amongst poor people and also amongst the well-to-do. The obstetric work is a grand opportunity for cultivating kindliness and humanity as well as technical skill.

Some Further Recommendations.

I cannot conclude these practical hints without begging you to take every opportunity of the invaluable mental gymnastic which writing commentaries for the senior clinical class affords. Nothing helps more in the rounding off of your knowledge. During your early hospital work keep to the medical text-book recommended by your professor of medicine. When you are working up your commentaries go further afield and read some of the original memoirs. Don't disparage the out-patient clinics. They and the skin clinics are very closely allied to your daily work in general practice. They constitute the great school of acquiring and testing your knowledge of the naked-eye signs of disease. Sir William Jenner used to give us his experiences of morning practice in his own consulting-room. The consulting-room was long, and from the time of the patient entering the room till he took his seat Sir William watched his behaviour and his gait and often gained thereby a hint as to his first questions and his initial lines of investigation. Sometimes these hints were elusive and he had to start on a fresh tack; often they were suggestive and fruitful.

I hope you will set your ambitions towards obtaining at least one hospital resident appointment. Best of all, try to get a house physicianship, a house surgeoncy, and an obstetric resident's post, and having held all the resident and non-resident posts that you can obtain at University College Hospital if your time and means allow, get a post at one of the special hospitals, where you will receive a small salary, preferably at a hospital for children. A resident post at a fever hospital or at one of the poor-law infirmaries give also invaluable clinical opportunities.

I can hear you say: "Who is sufficient for these things?" You are all sufficient if you will learn by blunders and chronicle in your own records your mistakes. Be sure to index your note-books—names of persons if possible, but another section for diseases. Be determined to maintain your own health at the maximum of fitness. Keep Saturday afternoons for athletics and country walks. Burn very little midnight oil. Avoid scratch meals and the doctor's bad habits of bolting food. A cigarette after lunch and dinner has its place, but don't smoke whilst you are working. Take the minimum of alcohol and only with food, and best of all try experiments on yourself of doing without.

Save a little time every day for general reading, the Bible first of all, then Shakespeare, and the great English essayists, poets, and historians, Bacon and Addison, Boswell's Johnson. Don't forget Montaigne and Erasmus's Colloquies, and Balzac's "Médecin de Campagne," the most beautiful picture of a country doctor's life. Godlee's "Life of Lister," one of the best biographies in the English language, will make a special appeal to University College Hospital men. Good music and good drama have their occasional rightful place.

You must cultivate good friendships. Join the Union and be faithful to it, but keep your links with home firm and constant. Tell your people about every part of your work and play and about your teachers and fellow students.

The preparation for a doctor's career is arduous and exacting, but I assure you that there need be no drudgery. In the acquisition of medical knowledge there is something of the joy of discovery and, moreover, there is the comfort of realising that through that knowledge you will have the power of saving valuable lives and of relieving much suffering.

PHYSIC AND PHILOSOPHY.

Abstract of an Address to Students of King's College Hospital on Oct. 3rd

BY ERNEST BARKER, LITT.D., LL.D.,
PROFESSOR OF POLITICAL SCIENCE IN THE UNIVERSITY OF CAMBRIDGE.

THE Greek word φύσις was originally connected with growth or becoming; but it soon widened out, exactly like the similar Latin word *natura*, which also means growth or becoming, to include all nature, inanimate as well as animate. It is from this word that we derive "physic" and "physician." Physic is the study of the processes of nature—the process of becoming, of growth, and of what Aristotle calls corruption—as it shows itself in the human body; and a physician is a man concerned with those processes—partly by way of understanding them, which is science, and partly by way of altering or affecting them in virtue of his understanding, which is art. The man who first isolated these processes for the purposes of an inquiry which we may call genuinely scientific was Hippocrates. As the Greeks themselves put it, he first separated medicine from philosophy. This means that he took out of the whole body of curious inquiry into φύσις at large, which the early Greeks called philosophy, the one subject of the physical processes of the human body, and said "This is enough for me." It does not mean that he thought medicine had nothing to do with philosophy in the sense of that word in which it means general reflection about life and the world. On the contrary, he was in that sense of the word a very philosophical doctor—as indeed it is always good that doctors should be also philosophers, though we cannot invert the proposition

and say that philosophers should also be doctors. But they might be better philosophers if they were.

There are two treatises, ascribed to Hippocrates, which I should like to mention. One is called "Concerning the Holy Disease," and deals with epilepsy. Of this disease Hippocrates says:—

"It seems to me no whit more divine or holy than other diseases. Other diseases as well have their φύσις from which they arise, and this, too, has its φύσις and cause. Men thought it was a sort of divine visitation through their inexperience and astonishment, because it is unlike the rest; and so far as they stay there, in a state of helplessness about understanding it, its divinity is preserved; but so far as they get some facility in the way of remedies by which they try to cure it, its divinity is destroyed. If it is to be thought divine through its astonishing character, holy diseases will be numerous on that score. I will show you other diseases no less astonishing which nobody thinks to be holy. Take fevers." . . .

And away he goes into fevers.

Now this seems to me to show a scientific temper; and the other treatise which I will mention, upon "Airs, Waters, and Places," is equally scientific. These natural facts, the writer tells us, produce such and such effects: winds, rainfall and contour all influence human character, and men's ways of living. But he is no determinist, and he acknowledges frankly that human institutions and laws may remedy the defects which climate left to itself will always tend to produce. This is just what we should expect a good doctor to say; the general environment in which you are living, he will tell you, is producing such and such results, but I can give you the rules of a regimen, corresponding in their way to the institutions and laws of a community, which will modify those results.

Now this attitude of the good doctor, which we find in Hippocrates and his school, is just like the general attitude of all Greek scientific inquiry; and I should not wonder if it had much to do in producing that general attitude. Let me mention some of the features of Greek scientific inquiry, as it appears, for example, in Aristotle; and let me try to show where it approximates, and may be indebted, to the methods and attitude of medical inquiry in the school of Hippocrates.

In that school the members were adepts in accurate observation. Observation, and explanation based on observation—these were their excellencies. All this, I believe, affected Aristotle—affected him directly in his zoological studies and perhaps indirectly in his studies of politics. He was himself an Asclepiad by birth, the son of the court physician of the King of Macedonia, and when he founded a philosophical school of his own in the Lyceum in Athens, as he did in his fiftieth year, he seems to have included medicine in its scope. If this is so we may say that the Lyceum—the earliest university of the world next to Plato's Academy—was the first to give any system of university education in medicine, treated side by side with other branches of knowledge.

I am inclined to think that we can find traces of the doctor—or at any rate of the zoologist who would hardly have been a zoologist without the doctor's aid—in the pages of Aristotle's "Politics." Just as the doctors of the school of Cos observed their cases, recorded their observations, and drew their conclusions, so Aristotle made, or had made for him, observations of 158 constitutions, and on the basis of these constructed the theory of the "Politics." He divides constitutions into normal and perverted, much as a doctor might divide men into healthy and diseased. He is particularly interested in perversions, as a doctor is particularly interested in diseases, and the fifth book of the "Politics," which is devoted to these perversions, has been called his study of the pathology of the State. But the doctor not only studies diseases; he seeks to prescribe remedies. In the same way Aristotle not only studied political perversions, such as greedy tyranny and selfish ologarchy; he also prescribed his cures. His prescription, we may say, is a moderate diet. Tyranny is rooted in power and nourished by power, but the less the tyrant presses his power—the more, as it were, he reduces his consumption of power—the more firmly will his power be grounded. Est modus in rebus.

When Aristotle classifies constitutions by their difference in structure, and in the light of the various forms of the governing organs of the body politic, he seems to be following a biological way of arrangement. Indeed, his whole philosophy, with its genetic trend and its insistence on the idea of development from embryonic beginnings towards the goal of a perfect adult form, may also appear to be derived from the study of embryology.

[Here Prof. Barker traced the influence of Aristotle on medical thought in the Middle Ages and proceeded to speak of the work of Linacre and Sydenham, two English doctors who might, he thought, have said to Medicine, "I could not love thee, dear, so much, loved I not learning more." He concluded:—]

There is one word of advice which I should like to give, and one word of gratitude I should like to say. My advice is simple. Clothe your physic with some philosophy—some love of general wisdom. There is no nobler figure in life than the wise doctor who has kept breadth of interest and a general capacity of mind. I think of Sir Thomas Browne; I think of one I knew, Sir William Osler. There is a large function in modern life for the doctor who is also a philosopher. We have had a great age of physics; I expect we shall next have a great age of biology. Biology, the science of the living organism, matters greatly to modern society, with all its problems of stock and breeding and true hygienic growth. Medicine is the science of the highest living organism, and it matters intensely to all human society that the science should be broadly cultivated and should reach out to all the problems of social life which it touches. A doctor owes a duty to society at large as well as to individual patients, and he should understand something of the nature of society at large if he is to do his duty—something about its problems, something of what he can do for their solution. That is where physic touches political philosophy; but it also touches philosophy at large, and the general understanding of the mind of man as it works in the world man has made.

I ask you to do something, but I also want to thank you for what you have done. One of the Hippocratic sayings is—

ἦν γὰρ παρῇ φιλανθρωπίη, παρέστι καὶ φιλοτεχνίη,

which is to say, if you have love of man, you have love of your art. The physician's humanity is wrapped up with his skill, and each of us can recall the thousand little *not* unremembered acts of kindness and of love that he has received from a great profession.

I have sometimes thought of doctors as pelicans—ready to pluck their breasts, as the pelican does in the myth, for the sake of their charges. All honour to them for it. But analogies are seldom perfect, and metaphors are often misleading. I therefore beg you, as I conclude—I beg you earnestly—to forget that one of the features of pelicans is—the length of their bills!

THE TROPICAL FIELD: ITS POSSIBILITIES FOR MEDICAL WOMEN.

Abridged from an Address to Students of the London (R.F.H.) School of Medicine for Women on Oct. 1st

BY ANDREW BALFOUR, C.B., C.M.G., M.D., F.R.C.P.,
DIRECTOR OF THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

Dr. Balfour spoke first of the recent improvements in the hygiene and sanitation of tropical countries, and welcomed the application of medical and physiological research to the problems of tropical diseases. Until comparatively recently, he said, an imaginary gulf was fixed between the diseases found in countries with temperate climates and those commonly encountered in the torrid zone, but we have come to realise that it is not so much a case of diseases peculiar to

hot countries as of maladies met with in lands which in certain respects are backward and undeveloped. Of the really important tropical diseases, so-called, we now know that there are only three which are strictly limited to the belt between Cancer and Capricorn—namely, African sleeping sickness, South American human trypanosomiasis, and African tick fever. Their limited distribution is to be explained in terms of their arthropod vectors, the tsetse-fly in the first case, some species of reduviid or blood-sucking bug in the second, the tick, *Ornithodorus moubata* in the third. Filariasis, another malady of the first rank, very nearly comes into the category, but the remaining truly tropical maladies, such as verruga, goundou, and ainhum, are of no great significance. Malaria, blackwater fever, dengue, phlebotomus fever, plague, relapsing fever, leprosy, ankylostomiasis, schistosomiasis, beri-beri, and even sprue and yellow fever are not strictly diseases of the tropics, although, partly on account of their ætiology, partly because of their association with unhygienic conditions, the result in many cases of an uncivilised environment, they nowadays prevail to a much greater extent in hot countries than elsewhere. One thing, however, is certain. They require to be specially studied, and tropical medicine can only be properly taught by those who have had experience of tropical conditions and are familiar with those ancillary sciences, entomology, helminthology, and protozoology, upon which much of it is securely based. In another direction our conception of tropical diseases, or at least of some of them, has altered, for we have come to regard malaria and, to a lesser extent, African tick fever as allies, in that we have added them to our therapeutic resources and employ them more or less successfully in the treatment of general paralysis of the insane and other late manifestations of the luetic state.

After reviewing a few of the salient features of tropical medicine in Africa, India, Ceylon, the Federated Malay States, Hong-Kong, China, British Guiana, and the West Indies, Dr. Balfour proceeded to discuss the possibilities in the tropical field for medical women. In his opinion, the outlook is not too promising, though it is slowly improving. India offers the greatest scope. Dr. Balfour acknowledged indebtedness to Dr. Margaret Balfour, who had supplied most of the following information on the opportunities for medical women in India. The work open to them includes: (1) the Women's Medical Service for India; (2) mission hospitals; (3) private practice; (4) public health work. There are also a few other openings, including research posts.

India.

1. *Women's Medical Service.*—An account of this Service will be found in THE LANCET of Aug. 25th (p. 419). It is supported by the Countess of Dufferin's Fund from a subsidy given by the Government of India. It is open to fully qualified medical women of British or Indian nationality and, at present, the subsidy permits of the employment of 44 medical women, of whom about 50 per cent. are chosen from India. Selections in this country are made by the Committee of the Countess of Dufferin's Fund, and applications should be forwarded through its honorary secretary, care of Major-General J. B. Smith, at the India Office. Those chosen are expected to have the kind of experience gained by holding house appointments. The Lady Hardinge Medical College at Delhi, where women students are prepared for the M.B., B.S. degree of the Punjab University, has a staff of eight professors or lecturers. Two members of the Women's Medical Service are supplied to the Agra Women's Medical School, which prepares for the L.M.P. qualification. One member is supplied to the United Provinces as superintendent of medical aid to women. Other details, including an estimate of the cost of living in India, will be found in the article to which reference has been made.

2. *Mission Hospitals.*—There are nearly a hundred of these staffed by medical women, and in many of them the standard is as high as in those of the Women's Medical Service. Medical missions served as the portal for women's medical work in India, which dates from 1869, when Dr. Clara Swain arrived from the United States of America.

3. *Private Practice.*—Here there are several difficulties. A medical woman from this country depending for a livelihood on private practice alone would find herself in a quandary. For one thing, she must know the vernacular of the district wherein she settles, and the habits and customs of the people. For another, she must have enough private means to live upon for some years, and to pay her way back home if necessary. For yet another, she will encounter rivals in the shape of the Indian women doctors, the numbers of whom are rapidly increasing. Needless to say, she should have some knowledge of tropical diseases. In other words, she should have attended a course of tropical medicine and hygiene before embarking on her venture. It is only in the large towns that private practice can be successful. In the smaller towns and villages the people are either too poor to pay adequate fees, or, illiterate, ignorant, and superstitious, they do not realise that good treatment demands and merits pecuniary reward. It is clear that, save in the case of persons somewhat specially situated, private practice in India does not hold out much hope to the medical woman. Dr. Margaret Balfour advises anyone embarking on the venture to try and get a temporary appointment in a hospital near the place where she intends to practise. This, she says, is often quite possible if the doctor is willing to act as house surgeon on a small salary.

4. *Public Health Work.*—Dr. Margaret Balfour writes on this subject: "Considering the high degree of maternal mortality in childbirth and the high infant mortality in India, it is astonishing that medical women are not more frequently employed in combating these conditions. We know that in England where the conditions are not so urgent several medical women are employed at the Ministry of Health whose duties are to inspect the work aided by Government, to weigh the facts disclosed by statistics, to watch the results of legislation, and to think out means and measures by which the existing state of things can be improved. In India not a single medical woman is attached either to the Public Health Department of the Government of India or to the public health departments of the provinces, and this in spite of the fact that evidence as to the conditions of childbirth and the domestic causes of infant mortality must be obtained by male officers at second hand. A very few medical women are employed under municipalities or charitable bodies in maternity and child welfare work, but are usually poorly paid. Such bodies usually employ a health visitor only, who often works without any supervision. Great interest is being taken in India in maternity and child welfare, but the real purpose of the movement—prevention, not cure—is not widely understood. The time is ripe for Government to take a more active part in this great movement, which might be done by forming a Bureau of Maternity and Child Welfare organised and run by a competent medical woman."

There are a few administrative posts for women, more or less concerned with aspects of public health, such as child welfare, the maternity welfare of women industrial workers, or the control of midwives, but these are mere drops in the bucket.

As regards *other openings*, there are 62 hospitals in India staffed by women doctors not attached to the Women's Medical Service nor to missionary societies. These hospitals are under provincial governments, municipalities, or Indian States. Some are good, others the reverse, and before a medical woman seeks one of these posts she should obtain full information from someone with personal knowledge of the conditions. One who wished to devote great wealth to a good purpose could not do better than contribute to the Countess of Dufferin's Fund. If, instead of 44 medical women, 444 were available in India, this might be one of the best ways of meeting the problems set forth in "Mother India," and of removing a reproach which exists and must exist so long as women and children labour under the sad disabilities which bar the way to progress, health, and happiness.

The Fitness of Women for Research.

There remains the question of research work, and here one may fittingly perhaps diverge for a moment to comment on the fitness or otherwise of women for research. It has often been said that women, owing to their mentality and temperament, cannot attain the highest flights in research work and rank with the great discoverers in science. Well, such a statement would have to be submitted to careful statistical scrutiny before its truth or falsity could be established, and in any case we know it is not true for individuals, as witness the work accomplished by Mesdames Curie and Phisalix, by Miss H. Chick, by Mrs. M. Mellanby, by Lady Bruce, by Dr. I. H. Pearce, by Miss M. Robertson and others, work of a high order which has in some

instances had important results. In any case, all cannot be pioneers. There is such a thing as consolidation of research, and there is much useful work to be done on the lower levels, while it is well to remember that the word research does not necessarily connote laboratories.

For example, field inquiries are much needed into the diseases in India caused by, or specially associated with, pregnancy. "Anæmia of pregnancy" is the largest single cause of death in childbirth. It somewhat resembles pernicious anæmia, but differs from it in its short duration, absence of remissions, the fact that it occurs in young persons, and that recovery, when it takes place, is complete. Dr. Balfour is herself investigating this important malady in Bombay. Osteomalacia, common in certain parts of India, absent from others, requires careful investigation. Puerperal beri-beri is a condition of which we know little, and so is "sutika," a puerperal disease found in Bengal, described 20 years ago but still awaiting elucidation. The cause or causes of eclampsia, so common in Bengal, should be explored, while the manifold conditions leading to the high infant mortality which is such a feature in the returns require that research of various kinds be carried out upon them. Much of this work can only be done by women, for only women can gain access to the material.

Here, then, would be an opening for those desirous of taking up research if only there was some organisation and some adequacy of funds. It must be clear that India has great potentialities for the medical woman, and equally apparent that, so far, little has been made of them. May we not hope that a cause which would benefit both the women doctors and those to whose needs, to whose dire necessities rather, they would minister will ere long receive the sympathy and support it so fully merits?

Africa.

Here we are at the beginning of things where women's work is concerned, except for isolated missionary effort. Still a start has been made under the auspices of the Colonial Office, both in West Africa and East Africa, and this audience should be gratified to know that women are engaged upon the same terms as men, and, speaking generally, have proved their worth.

The most advanced work is being done on the Gold Coast, where there are properly constituted maternity and child welfare centres and where three medical women are employed. Here also we find in a good post at Accra, as assistant pathologist, a lady doctor, a former student of the London School of Hygiene and Tropical Medicine. In Nigeria, where there are also three women, the work is more of a dispensary nature, but is developing into definite clinics for women and children. In Sierra Leone one medical woman is doing excellent work in connexion with infant and child welfare. If we turn to East Africa we find in Uganda two women engaged in dispensary and maternity and child welfare work, and one acting as assistant bacteriologist at Entebbe. There is one woman dispensary worker in Tanganyika, and in Kenya a medical woman has been appointed to organise child welfare work. It is not unlikely that women may yet hold special research posts in some of the African laboratories, and, while the development of women's medical work in Africa is bound to be slow, it is assured of a future under the ægis of the Colonial Office.

Private practice in tropical Africa is scarcely a feasible proposition at present, whatever may happen at a later date, while, from a purely mundane standpoint, missionary posts do not seem to be very attractive. Perhaps, however, they have their compensations.

Ceylon.—Malaya.—Hong-Kong.

There is little to be said about Ceylon. A woman doctor is the head of the women's hospital in Colombo, but political difficulties place a bar to the entry of women from this country into the local colonial service.

On the other hand, Malaya, from the woman's point of view, is rather a bright spot. There are about 16 women medical officers in Government employ, for the most part engaged in child welfare work and employed in hospitals for women and children. The number is likely to increase. So far no public health posts have been open to women in Malaya or the Straits Settlements. There are a few private practitioners, but private practice presents difficulties for women in this part of the world. Of Hong-Kong, Mrs. Minett, who is my chief informant, has not much to say. A woman holds a Government appointment as school medical officer, and there is a medical woman with an assistant in charge of native maternity hospitals. No infant or child welfare work has yet been organised, though there is a huge field. Private practice could be built up and would in time be lucrative, but the language is a difficulty and there will be increasing competition from Chinese women who are qualifying in medicine. Single-handed women's practice has been tried and abandoned several times. "A firm of women," says Mrs. Minett, "with capital enough to wait and to enable them to spend six months in learning the very difficult language, might do extremely well." Pioneers are needed who can afford to do voluntary work, and there is scope for ambulance training and general health training among the Chinese.

British Guiana.—West Indies.

The situation in British Guiana is much the same as elsewhere. There was for a space a part-time woman medical officer in Government employ for infant welfare work. She acted also as honorary physician to the tuberculosis dispensary. Now there is no salaried post for women though, as ever, there is plenty of work to be done. Opportunities for private practice exist, but it would, of course, be a slow-growing affair and require capital at the outset. Here and in the West Indies, as Dr. Stanton has told me, any hope must, for the present, lie in unofficial directions, and it is clear that such hope cannot be of a very comforting kind.

Conclusion.

Whatever the future may hold, let it be remembered that it is no use going to the tropics medically unprepared. That is fair neither to the doctor nor her patient. It is little short of criminal to send medical men or medical women to hot climates unless they know how to take care of themselves and how to diagnose and treat those diseases which, if they cannot strictly speaking be called tropical, yet are found chiefly in the tropics and require, nay demand, appropriate study for their correct understanding. It is not enough to be a competent obstetrician or gynæcologist, though that counts for much. There must be that special knowledge which is only acquired by special study and which, if properly assimilated and applied, spells efficiency.

LEISURE AND THE MEDICAL STUDENT.

Abstracted from an Address to Students of the Westminster Hospital on Oct. 1st

BY ARNOLD C. POWELL, M.A.,
HEAD-MASTER OF EPSOM COLLEGE.

THE world is calling out more insistently now than at any time in its history for educated men and women in all professions, and in that of medicine the need for all-round culture, for catholicity of intellectual sympathy, is at least as urgent as is the need in any other high calling. Is the supply worthy of the demand? Not altogether, I fear. In years gone by the country practitioner was, as often as not, the Nestor of his community, the universal encyclopædia, the arbiter of taste, confessor, comforter, general autocrat. His medical knowledge was often not great, his surgical skill rudimentary; but he was a wonderful and unique being, a vital force in the land. Infinitely inferior in technical skill and knowledge to the general practitioner of the present day, he had valuable qualities, nevertheless, that it would be well for men of our generation to cultivate. But, "Have they the time?" you may ask. Through all stages

of their career the generations past and gone had far more leisure than is possible to us; the fields of learning they had to explore were nothing like as vast as they are now; their actual jobs were softer; their training far less exacting. They were able, as we are not, to devote much time to the so-called "humanities," and so get a wide-angled view of life. Is it then to be wondered at that, when the enormous growth of examinational requirements is realised, the modern medical student develops a materialistic view of his life's responsibilities? In short, is there any longer time available for the medical student to be anything but a medical student?

That is the crux of the whole matter: is there time for general cultural development, for anything more than work and play? Yes—emphatically yes! There is not only time, but there is absolute necessity, if civilisation is to continue its upward evolutionary progress. Our days are too kinetic; a little more knowledge of the laws of statics would prove a salutary medicine for the modern disease of mobilophobia. It is the lack of control of the time of leisure at our disposal—however small it may be—that is one of the present-day curses. Sport, theatres, kinemas, dances, motors—all have their value, but the evil tendency nowadays is to over-estimate that value, to imagine that the only form of rest is slacking. Many of us, I fear, have to reach an advanced old age before the realisation comes that mental laziness may in the end prove the most tiring, the most enervating, of all human occupations.

What, then, is leisure, how has it grown into being with the ascent of man, and what lessons can we gather from the history of its development? "Freedom from *pressing* business, as distinct from sheer indolence," is to me a satisfying definition of the word. Leisure, unlike indolence, presupposes work; it gives one time to study the work of others. It is definitely rest from work; it is change of work—the highest form of rest; it must necessarily follow work. Properly employed—and it is not leisure if it is merely time wasted—it engenders more work, better work, nobler thoughts, higher ideals. And so we have the cycle complete; the storing up of latent energy which, in due course, is to be set free in the form of kinetic energy. Then, again, the period of apparent quiescence—the recharging of the accumulator.

Let us see if we can discover the place history gives to leisure in the economic foundations of our complex national life. These foundations I think we can make threefold. First, *capital*, the basis of all freedom, the possession of which means that we have not to concentrate our thoughts on the problem of the next meal. It is the incentive of capital—in its broadest sense—that has been the basis of all the world's great movements. And why does every human being worth his salt work hard to secure capital? Because he wants with all the strength of his being that second of the foundations of which I speak, *leisure*. The prime object of spending—and, therefore, of amassing capital, is to secure this leisure. And then the old cycle once more—the leisure so obtained is employed for the gathering of more capital. The third foundation, of which one could speak for hours, though we must content ourselves with only passing reference, is *mobility*—that opposite of physical stagnation, intermittent shocks in the leisure which is the goal of all mankind.

Pithecanthropus, the sub-man, had no leisure at all in the proper sense of the word; it was mere animal relaxation. Physically necessary as a rest from gorging and killing, morally important as being the state from which real leisure developed.

The Neanderthal man could light a fire, and knew how to shape and sharpen flints by knocking them against each other, *in a certain definite manner*. These last five words tell us that gradually there is now growing into the rest periods of primitive man a quality of thought, of reasoning that is transforming part of them into leisure. In the contact of flint with flint sparks were generated; one day these sparks kindled some dry sticks close by. Next day—perhaps some hundreds of years later to be more accurate—these sparks were made on purpose, and the flints were banged together under a pile of brushwood. Fortuitously one day a haunch of the venison tumbled unnoticed into the blaze at the cave-mouth, was pulled out, and tasted ever so much nicer.

On further developments in man's control over matter I do not want to enlarge; what I have mentioned already is intended to emphasise the influence of the development of the physical activities upon the growth of imagination, of contemplation, and of creative thought. Let us proceed with this mental development. Retrospection begins to appear in the lowly mind. The desire for and love of trophies is born; the head-hunter, the scalp-collector, and with the desire for a permanent reminder of prowess the epic is born, history has come into being. Art has arrived to dwell with man; he dances as a physical sign of his happy memories; rhythm, the sire of music, becomes incorporated in his leisure. The tom-tom, the pipes, follow in natural sequence. With a bit of coloured earth he draws the reindeer he slew yesterday; on the walls of the cave he savagely cuts with a sharpened flint the outline of a mammoth that has trampled his wife to death. It is quite conceivable that the pleasure derived from this newly found use of his leisure well outweighs the ephemeral pain of his bereavement. Man has experienced the delights of pictorial art.

So far mankind has hardly tumbled out of his cradle; his thoughts, though now fast developing in complexity, are still concentrated on the concrete. But now he begins to think in a higher plane. "Why," says he, "was I not victorious in that last fight?" "How does the thunder come?" How? and why?—something new in his mentality, something to bring a new and vital interest into his leisure. The abstract confronts him, and imagination becomes an integral part of human development. The first ideas of some omnipotent Deity flash vaguely through his mind, and he theorises—he invents abstract thought. Religion is born with its twin brother, science. And with advent of reasoning, concrete and abstract, we have with us tradition, the ancestor of history. But first came imagination, the sire of all the arts and sciences. In early folk-lore man found both the material and the beauty for the poetry that was later to gladden his soul, for the music that was to revolutionise his leisure hours. Æsthetic love of the sights and sounds around him, of the pictures and songs he slowly learnt to create himself, sweetened the hours that, in his strenuous existence, had to be set aside for rest.

And so man has now solidly established leisure as a definitely purposeful part of his life. His manual labour, his hunting, his housekeeping, his fighting, though still looming large on his horizon, are now definitely, if to him unconsciously, in their proper place as a means to an end, the beauty, the happiness, the social harmony, the intellectual interplay, of human life.

Purposeful leisure, then, we can take it, has now been established as one of the fundamentals of civilised life. No curve of human progress has ever been without humps on its course. Let us hope that, on the whole, the curve continues and will continue to work upwards.

When we follow the history of our own country, tracing the gradual development of democratic control from a practically absolute monarchy, through Magna Carta, the Petition of Right, the Reform Bill of 1832, to the parliamentary rule of the present day, it must strike everybody that, out of leisure, with its protected capital, has been evolved our parliamentary system. In the olden days of despotism there was no real leisure; with the gradual transformation of the peoples' indolence, between bursts of manual labour and fighting, into properly organised leisure, came the equally gradual power of corporate and individual deliberation which bore fruit in self-government. Cabinet responsibility, too, was just as surely of the same growth, and also that essentially democratic system in government, decentralisation, without which the human touch is lost, and democracy gradually drifts back to the tyranny of bureaucracy. The British Empire is the finest example the world has ever seen of successful decentralisation, a decentralisa-

tion which, with all its shortcomings, has brought to man greater happiness and prosperity than any other form of empire control. And all the ramifications of our great system of administration, our King, our Parliament, our self-governing Dominions, our county councils, our borough councils, our literature, art, music, science, all have sprung from a proper appreciation, a proper use, of that great and abiding blessing, leisure.

THE ENEMIES OF MAN.

Extract from an Address to Students of the Middlesex Hospital on Oct. 2nd

By A. E. Webb-Johnson, M.B., F.R.C.S.,
SURGEON TO THE HOSPITAL.

In his preoccupation with the larger animals and his perpetual fight to control the vegetable kingdom, little did early man think that his real enemies were microscopic animalcules and unicellular vegetable microbes, and that often the angels of death were of the insect world. Primitive man had to equip himself to fight the enemies visible to him. At long last, towards the end of the nineteenth century, the hands and brain of modern man fashioned instruments which brought the real enemy into view. The battle was joined, and man, instead of fighting something mysterious had the hosts of death captive. He could study them as tiny specks on a microscope slide, or hold them encaged in a test-tube—growing at his command, tamed, attenuated, robbed of their virulence, and oftentimes to be put to man's service.

All through the ages a golden truth is blazoned—the path of progress is by experiment, research, and trial. Research must be fostered and encouraged. While it is not given to all of us to add to the sum of human knowledge, we can all help research. We can all be seekers after truth and ready to explore with open minds the paths indicated by others. Too often a new truth has to fight its way to acceptance against unreasonable opposition, or some fixed opinion or bias, and—

> "Alas, what years you thus consume in vain
> Ruled by this wretched bias of the brain."
> (Crabbe.)

It is therefore often

"not the man who first says a thing, but it is he who says it so long, so loudly, and so clearly, that he compels men to hear him—it is to him that the credit belongs." (Sydney Smith.)

A study of the history of the fight brings out another lesson. The coöperation of the sciences which dates from Harvey's time must be made closer and closer. It is by coöperation that advances can be made most speedily. Medicine is dependent on the fundamental sciences. From day to day we make greater demands on them for diagnosis and treatment. It may yet be that the dread enemy of cancer will be brought to understanding, prevention, and cure by the chemist and the physicist. Already it is known thet there is a difference between the chemical requirements of cancer cells and normal cells; already it is known that radium in proper doses has a lethal effect on cancer cells and spares the normal cells. Further work in biochemistry and biophysics may bring us a means of early diagnosis and successful treatment.

Still another point is clear. All through the ages man has required for his search more and more elaborate tools, instruments, and machines. To provide equipment of the finest order and laboratories of the best is now a costly matter. Here the men at the Base, the men of great generous hearts and far-seeing minds, can help and have helped. In our own medical school we have been blessed with great benefactors. The Joel Chair of Physics, the Chair of Physiology, and the Courtauld Chairs of Anatomy and Biochemistry are endowed, and you see brought to the service of mankind great institutes for scientific research and application—the Barnato-Joel Cancer Research Laboratories, fast becoming, with the development of radiotherapy, an institute of physics, the Bland-Sutton Institute of Pathology, and the Courtauld Institute of Biochemistry. By these institutes the fundamental sciences of chemistry and physics become closely linked with physiological, pathological, and clinical study, and are brought in very fact to the bedside. Much remains to be done and in no better way can large-hearted benefactors with the necessary vision contribute to the progress of the race and the winning through of the fight against man's enemies than by the gift and support of laboratories for the study, and of hospitals for the treatment of disease.

But we must ensure that the teachings of research are followed. Even the teachings of Pasteur have not been fully applied. It is nearly half a century since Koch discovered the tubercle bacillus. Surely it is time it was banished into the wilderness. The fight against man's deadliest enemies is a fight for all. It is not a fight for armies only, but for nations, a true League of Nations' task. Preventive medicine is our aim, and it is worth much labour and much sacrifice. The highest aims of preventive medicine can only be achieved by the coöperation of all health services. There must be a coördinating head which to act with full authority should be the State. The great hospitals are ready and willing to play their part by providing accommodation for clinics which it may be desirable to establish. It is for public authorities to make full use of the facilities available and to avoid duplication of services. By coöperation not only will research be stimulated and fostered, and all the resources of the great hospitals be at the service of a great cause, but medical education will go hand in hand with research and treatment for the benefit of all.

We have a glorious inheritance. I will not myself attempt to assess the value of British contributions to the common victory, but will quote the late Sir William Osler, who said:—

"Bichat, Laënnec, and Louis laid the foundations of modern clinical medicine; Virchow and his pupils of scientific pathology; while Pasteur and Koch have revolutionised the study of the causes of disease; and yet, the modern history of the art of medicine could almost be written in its fullness from the records of the Anglo-Saxon race. We can claim every practical advance of the very first rank—vaccination, anæsthesia, preventive medicine, and antiseptic surgery, 'the captain jewels in the carcanet' of the profession, beside which can be placed no others of equal lustre."

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdr. G. Carlisle is placed on the Retd. List at own request.

ROYAL NAVAL VOLUNTEER RESERVE.

Proby. Surg. Sub-Lt. A. F. Davy to be Surg. Sub-Lt.

ROYAL ARMY MEDICAL CORPS.

Capts. J. A. C. Kidd and G. G. Drummond to be Majs.
Lt. G. C. Phipps to be Capt.
R. H. Dunlop to be Temp. Lt.

REGULAR ARMY RESERVE OF OFFICERS.

Col. J. McD. McCarthy, late R.A.M.C., having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY.

Hon. Col. A. Thorne resigns the appt. of Hon. Col. R.A.M.C. Units, 47th (2nd Lond.) Div. T.A.

General List: Lts. J. J. D. Naismith and S. Vatcher to be Capts.

Hygiene Companies: Lt. B. Stewart to be Capt.

INDIAN MEDICAL SERVICE.

Maj.-Gen. H. J. K. Bamfield retires.

Special Articles.

THE VITAMIN CONTENT OF MARGARINE.

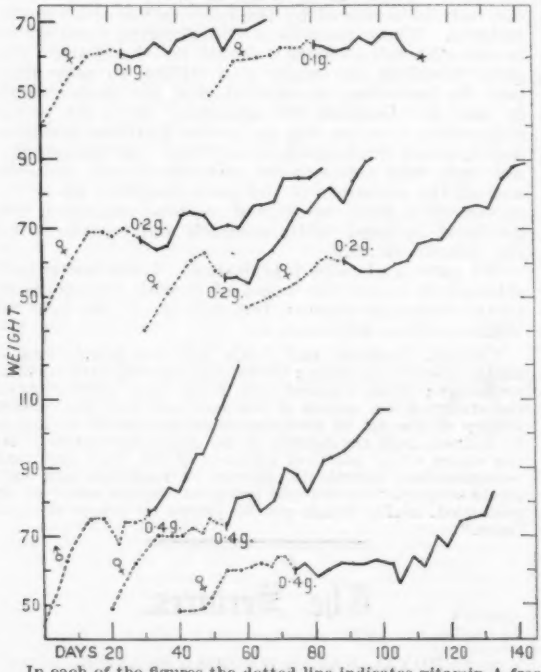
(*a*) VIKING MARGARINE. (*c*) WELCOME MARGARINE.
(*b*) SILVER TRAY MARGARINE. (*d*) GOLD CHAIN MARGARINE.

BY KATHARINE H. COWARD, D.SC. LOND.

(*From the Pharmacological Laboratories, Pharmaceutical Society of Great Britain, London.*)

IT has long been recognised that most brands of margarine are inferior in nutritive value to butter because of their lack of the accessory food factors known as vitamins A and D. Recently Planters Foods Limited have been advertising the sale of four brands of margarine in which this deficiency is made good by the process of incorporating a vitamin concentrate during the manufacture. These brands are known as Viking, Silver Tray, Welcome, and Gold Chain, and they differ from one another in the composition of the fats used in the preparation of each brand. The vitamin concentrate added is the same for each, both in nature and in quantity.

FIG. 1.—*Vitamin A Test on Viking Margarine.*
The twelfth sample examined.



In each of the figures the dotted line indicates vitamin A-free diet only, and the continuous line shows the supplement of margarine given daily.

In 1927, when the vitamin-testing department of the Pharmaceutical Society of Great Britain was established, Planters Foods Limited requested the Society to investigate the truth of the claim that these margarines were equivalent in their content of vitamins A and D to the best summer butter, and, further, to be willing to issue a certificate endorsing the claim if the investigation showed that it was justified. On account of the importance to the public of an independent testimony, the Society agreed to do this under certain conditions which were accepted by Planters Foods Limited. The most important of these were: (1) that the samples of margarine

FIG. 2.—*Vitamin A Test on Silver Tray Margarine.*

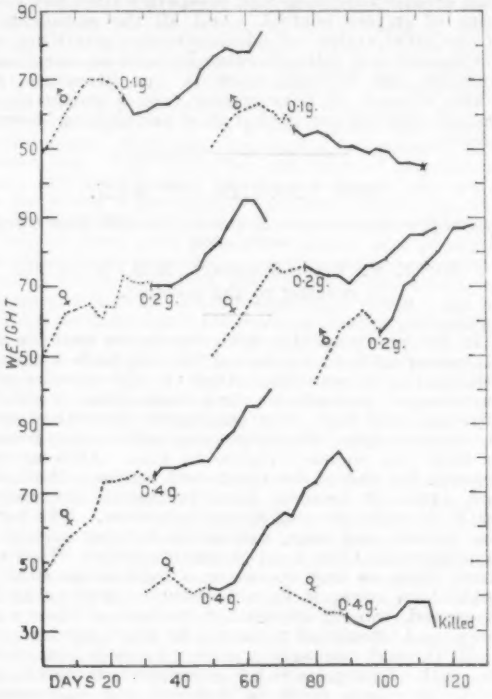
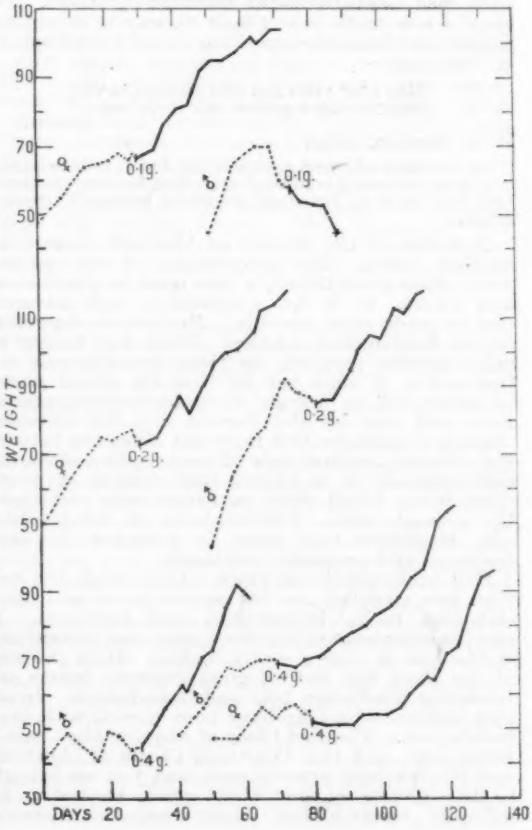


FIG. 3.—*Vitamin A Test on a Sample of Fresh Butter Bought in early May, 1928.*



examined should be bought by the Society in the ordinary retail shops; (2) that before the issue of a certificate a sufficient series of samples should show equivalence with butter; (3) that the certificate when issued should only be used so long as regular monthly examinations continued to give satisfactory results.

During the last 17 months a series of comparisons have been made between 14 samples of these four

FIG. 4.

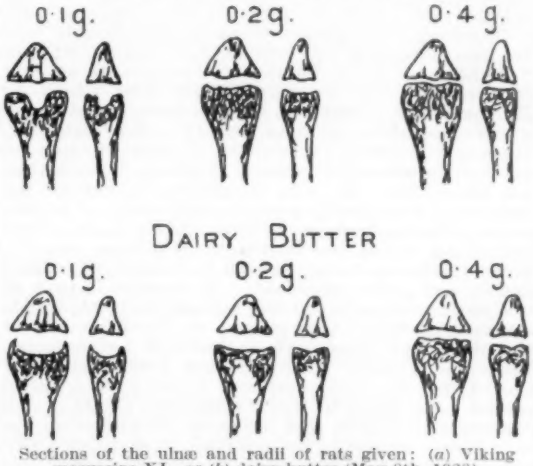
Sections of the ulnæ and radii of rats given: (*a*) Silver Tray margarine, (*b*) Viking margarine XIII., (*c*) dairy butter (May 29th, 1928), or (*d*) irradiated ergosterol. The highest dose, 0·4 g., of each of the margarines is equivalent to the highest dose, 0·00005 mg., of irradiated ergosterol. The butter was at this time of the year only slightly less potent than the margarine.

brands of margarine and 14 samples of fresh butter bought at the same time.

The tests for vitamins A and D have been carried out by the methods described in the Society's booklet of tests.[1] The assay of vitamin A is based on the response given to small doses of the butter or margarine by animals which have become steady in weight on a diet deficient only in vitamin A. A special feature of the Society's vitamin A free basal diet is that it is rendered completely antirachitic by irradiating it in very thin layers under a mercury-vapour lamp. It is thus assured that cessation of growth is *not* due to a lack of vitamin D, and any response in growth when butter or margarine is given is due to the vitamin A content of the substance under examination.

The assay of vitamin D is based on Steenbock and Black's technique for the "line" test. Rats are rendered rachitic by 3–4 weeks feeding on a diet containing an excessive amount of calcium. Some of them are then given graded doses of the substances, butter and margarine, to be compared, others are given graded doses of the Society's standard preparation of irradiated ergosterol for a period of ten days. On examination of longitudinal sections of the ends of the ulna and radius, stained with silver nitrate and exposed to the light, the amount of calcification can at once be seen and comparisons drawn. The reason for making the comparison with irradiated ergosterol as well as with butter is to obtain a value of the antirachitic potency of the product in absolute units. The Society has defined a unit of antirachitic potency (vitamin D) as that amount of activity

FIG. 5.



Sections of the ulnæ and radii of rats given: (*a*) Viking margarine XI., or (*b*) dairy butter (May 8th, 1928).

contained in 0·0001 mg. of its standard preparation. (It is hoped that large quantities of this standard will shortly be available for other workers in this field.)

Results.

The results show, without any doubt, that these margarines are equal to the best summer butter in their vitamin A and D content. Typical results only are shown in the diagrams. The vitamin D test is the only one so far in which a standard preparation is available for assay, and it is to be emphasised that the margarines showed a remarkably constant vitamin D content, a dose of 0·4 g. of each sample examined being equal in antirachitic potency to a dose of 0·00005 mg. of irradiated ergosterol, from which it was deduced that the margarines contained 1·25 units per gramme. The vitamin D content of the butters examined in this work from time to time varied; only in one sample was it found to be as much as 1·25 units, mostly it was 0·75 to 1·0 unit. No sample of butter bought in the open market has been found to have a vitamin D content higher than that of the margarines.

[1] Tests. Pharmacological Laboratories, Pharmaceutical Society. St. Clement's Press. London. 1928.

GLASGOW REFRACTION HOSPITAL.—Sir Matthew Montgomery last week formally opened this institution, which became available to the public on Oct. 1st. It is managed by a committee of qualified opticians and is mainly for examination purposes. No treatment will be given, patients being sent to the eye infirmary or some other ophthalmic institution, but free spectacles will be provided for necessitous persons.

THE LONDON MEDICAL EXHIBITION.

THIS exhibition, the eighteenth, which was open to medical men only, from Oct. 1st to 5th, was the largest that has been held, every available inch of space in the upper and lower halls of the Central Hall, Westminster, being occupied, while the attendance of London and home counties' medical men was larger than usual, as was the number of overseas visitors. The exhibits included medicinal products, surgical, optical, and aural instruments, electrotherapeutical apparatus, orthopædic appliances, X ray outfits and radiographs, ultra-violet rays apparatus, and other exhibits which practically covered the whole of medical and surgical treatment and practice, while room had to be found for a special section for actinotherapy and allied branches. The following is a brief review of the exhibition.

DRUGS AND PHARMACEUTICAL PREPARATIONS.

BURROUGHS WELLCOME AND CO. (Snow Hill-buildings, London, E.C.). The exhibit of this firm attracted considerable attention. Among the wide selection of products shown were "Tabloid" and "Hypoloid" Ephedrine, which is now largely used for the treatment of asthma and hay-fever; and "Wellcome" Liver Extract for pernicious anæmia. Of recent years a series of products issued by Burroughs Wellcome and Co. has been found of the greatest possible value in leprosy. The earliest of these is "Moogrol," a mixture of esters of the acids of the chaulmoogric series. Further investigation has proved that by using the sodium salts of the less irritating, lower melting-point fatty acids of hydnocarpus oil, the best results were obtained, and these have been issued by Burroughs Wellcome and Co. under the brand name "Alepol." "Avenyl," a third anti-leprotic, was exhibited. It is notable that all "Wellcome" serological and related products, a wide selection of which was shown, are British made at the Wellcome Physiological Research Laboratories, Beckenham, Kent.—THE BRITISH ORGANOTHERAPY CO., LTD. (22, Golden-square, London, W.), called special attention to Saccharomycin (B.O.C.), an isothermal, isotonic, and living yeast whose activation is best at body temperature. It is particularly indicated for furunculosis, acne, and other conditions where yeast has been found useful. A large range of glandular preparations was also shown by this company: "Opojex" lymphoid solution for sexual impotentia, severe nervous disorders and degenerative conditions; Evatmine for asthma, spasmodic affections, and chilblains; and liver preparations.—OPPENHEIMER, SON AND CO., LTD. (179, Queen Victoria-street, London, E.C.), made a feature of vitamin preparations, Vitad (vitamins A and D) in particular, which is the purified unsaponifiable fraction of cod-liver oil. Vitad in palatinoid form is portable, easy of administration, and tasteless. Bipalatenoids for exhibiting ferrous salts, and Roboleine which contains animal fats, maltose, diastase, with natural nitrogenous and phosphoric compounds, together with the "A," "B," and "C" vitamins, were also shown.—MAY AND BAKER, LTD. (Battersea, London, S.W. 11), exhibited a very representative selection of their well-known pharmaceutical and new preparations, including Halarsol, a stabilised solution of 3-amino 4-hydroxyphenyldichlorarsine hydrochloride for the treatment of yaws by intramuscular or subcutaneous injection; Parosan, an organic arsenic compound of low toxicity for oral administration in the treatment of disseminated sclerosis; and Neobistovol, for intramuscular and oral use in syphilis and yaws. Attention was also drawn to Arthyrytin (ammonium ortho-iodoxy benzoate), a new remedy for the treatment of chronic arthritis.—H. R. NAPP, LTD. (3 and 4, Clements Inn, Kingsway, London), among a wide selection of pharmaceutical products, showed magnesium "Perhydrol," an odourless and tasteless powder which readily dissolves in dilute acids with the production of H_2O_2 to replace Hydrogen Peroxide for oral administration; Normacol, an intestinal evacuant; Theosol, theobromine calcium salicylate, indicated in hypertonia, arterio-sclerosis, spastic vascular conditions, asthma, angina pectoris, and as a diuretic; Matronax, a complex ovarian sedative compound; and Ephetonin, which replaces adrenalin in bronchial asthma and hypotonia.—HOWARDS AND SONS, LTD. (Ilford, near London). A prominent exhibit of this firm, which is well known for its production of soluble aspirin, was a selection of aspirin tablets in a variety of colours, so as to disguise the nature of the drug when prescribed by the medical practitioner. This firm also drew attention to Agotan Ointment, a new form of treatment for rheumatoid conditions due to excess of uric acid; Hydrogen Peroxide and Standard Ether, which is used in a large number of medical institutions in London and the provinces. Many fine chemicals were also shown.—MENLEY AND JAMES, LTD. (64, Hatton-garden, London, E.C.), drew particular attention to Neuro Phosphates (Eskay Brand), for which the claim is made that it presents the glycerophosphates in a stable, readily assimilable, and palatable form. Although it has only recently been introduced in this country, clinical reports from Canada and the United States have been very favourable. In addition, a wide range of Iodex products were shown, and the Thermolite Lamp, for the application of radiant heat, infra red rays, demonstrated.—W. MARTINDALE (12, New Cavendish-street, London, W.) showed a remarkably wide range of pharmaceutical preparations, including Methyl-Aspriodine containing 39·7 per cent. iodine and the equivalent of 56·3 per cent. aspirin. This is intended to supersede methyl-salicylate (B.P.) for rheumatic affections and as a general local analgesic. Peptone "sterules" for use in bronchial asthma, animal extracts, pituitary, supra-renal, thymus, and so forth were exhibited, as also peptone "Sterules" for use in asthma and in hay-fever, and conditions which exhibit an anaphylactic character or sensation; and sphagnum moss dressings were also made prominent.—SAVORY AND MOORE, LTD. (143, New Bond-street, London), exhibited their Food for Children, with many striking photographs of the benefits obtained from its use; Peptonised Cocoa and Milk, and Peptonised Milk, their advantages being ease of digestion and nourishing qualities; Magnesia Cordial; Bismoid Suppositories for hæmorrhoids; and pharmaceutical preparations in wide variety. Attention was also called to the antiseptic drums of sterilised dressings of John Bell and Croyden, with whom Savory and Moore are now associated.—HEWLETT AND SON (35–42, Charlotte-street, and 83–85, Curtain-road, London, E.C.) presented a large number of original preparations, including Antiseptic Cream for eczema, abrasions, and so forth; and a series of medicated skin lotions that readily evaporate on the skin, Evapogens; Hormonigen, an improved ointment for hæmorroids, both internal and external; and Gargar Formalin Co. (Hewlett's), an efficient and pleasant gargle and mouth wash.—CROOKES' COLLOSOLS LABORATORIES (22, Chenies-street, London) — whose interesting exhibit attracted many visitors by their presentation of a film showing Brownian movement—had among their new features Collosol Metallic Bismuth, which is quickly absorbed, and it is claimed that the danger of toxic symptoms associated with many preparations of bismuth is here avoided. Collosol Mercurochrome, which is readily soluble, was also shown, as well as Collosol Lactomagnesia, containing approximately 10 per cent. of magnesium hydroxide in colloidal form. Besides neutralising acids without the evolution of gas, it is a mild laxative.

THE BRITISH DRUG HOUSES, LTD. (Graham-street, London, N.), among their well-known vitamin products exhibited Radiostol, Radiostoleum, and Radio-Malt, as well as a palatable powder liver extract. A feature was also made of their Aether Puriss, Ephedrine, Caprokol, Pituitary Extract (posterior lobe), and Shadoform, a readily prepared liquid meal for X ray diagnosis.—NUJOL LABORA-

TORIES (Albert-street, Camden Town, London, N.W.). The intestinal lubricant, Nujol, which is manufactured to a rigid standard of viscosity, proved to be correct by exhaustive clinical research, was shown by the representatives of this laboratory, who pointed out that the cost of the preparation has been considerably reduced. Mistol, a combination of Menthol, Camphor, and Eucalyptol, with a pure mineral oil for use in an atomiser or with a dropper for medicating the mucosa of the nose and throat, was also demonstrated.—EVANS, SONS, LESCHER AND WEBB, LTD. (56, Hanover-street, Liverpool; 50, Bartholomew-close, London, and at Runcorn), made a prominent exhibit of Hepatex, a highly concentrated extract of liver which is put up in bottles of 4 oz. containing the equivalent of 64 oz. of fresh liver. It is palatable, and it is not necessary to add it to soups or similar vehicles. Another outstanding exhibit of this firm was Quinine and Urethane solution for the injection treatment of varicose veins, while prominence was given to a vaccine for the common cold, and to Medisoaps, medicated soaps for skin treatment.—G. W. CARNRICK CO. (Brooks and Warburton, Ltd., 40–42, Lexington-street, London) showed Endocrine products in great variety. These are made from the fresh glands of healthy animals, and the standardisation and analysis of the preparations are supervised by expert chemists.—THE BRITISH ALKALOIDS, LTD. (104, Winchester House, London, E.C. 2), again made prominent T.C.P. (Trichlorophenylmethyliodosalicylic acid in H_2O) with powerful germicidal properties, analgesic, antithermic, keroplastic, non-hæmostatic, non-caustic, non-toxic. T.C.P. B^3 Colloidal Emulsion is recommended in cases of intestinal toxæmia and its sequelæ. Ferro Vitamines, Yeast dried at low temperature in vacuum containing all the water soluble vitamins combined with the polyhalogen: Ferrobromoacetyliodosalicylate, also attracted considerable attention.—THE SANDOZ CHEMICAL WORKS (5, Wigmore-street, London) made a special feature of Sandoptal (Isobutyl-allyl-barbituric acid). This new hypnotic is of low toxicity and non-irritant, while it is claimed to be free from dangerous subsidiary actions. Among other products shown by this firm were Femergin (ergotamine tartrate), the pure active specific alkaloid of ergot of rye; Lobeline for the relief of grave respiratory troubles of central origin; and Bellafoline, the total natural alkaloids of atropa belladonna.—DESHELL LABORATORIES, LTD. (Braydon-road, London, N. 16), drew attention to the emulsion of medicinal paraffin and agar-agar, known as Petrolagar, for the treatment of intestinal disorders, which is supplied in four forms—namely, plain, phenolpthalein, alkaline, and unsweetened.

(To be continued.)

A NEW NURSING HOME AND CLINIC FOR LONDON.

CONSIDERABLE interest was excited in the Harley-street area by the appearance on the morning of Thursday, Sept. 20th, of a large board at the corner of Devonshire-place and Marylebone-road, announcing the proposed erection of the London Clinic and Nursing Home (see Fig. 1) on the site immediately east of the board. The area to be covered (approximately 40,000 feet super.) is shown below (Fig. 2). The property will be held on a lease from the Lord Howard de Walden Estate for a term of 99 years, computed from July 6th, 1926, at a ground rent of £2250, the rent from July 6th, 1926, to July 6th, 1927, being £750, and from July 6th, 1927, to July 6th, 1928, £1500. We have made inquiries into the purpose and scope of the institution, the building of which will cost £300,000, and learn that it is being established as a nursing home with 175 beds for paying patients. Moreover, the group of consultants, representing various branches of medicine and surgery, who originated the scheme have expressed their willingness to rent consulting rooms at the clinic if they are provided with these rooms and other amenities under one roof. They will act in consultation with a patient's own medical man, and if necessary with one another. In the nursing home there will be suites of rooms with every luxury to meet the wishes of the wealthy classes, and also rooms where the total charges made will be based on a scale suitable to patients with moderate means. It is hoped that it will be found possible to take some deserving cases at less than cost. The fees quoted for accommodation in the nursing home will so far as possible be inclusive.

FIG. 1.

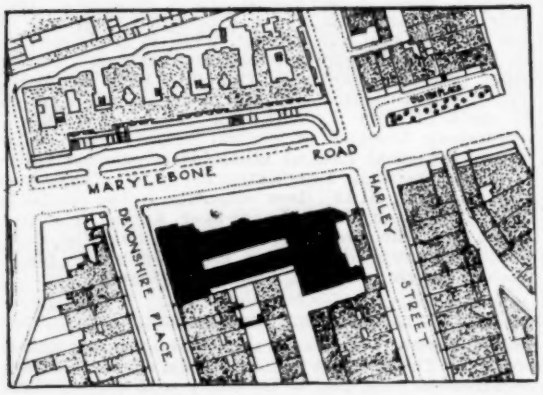
The London Clinic and Nursing Home as it will appear

Space has been provided for radium, X ray, deep X ray, hydro- and actinotherapy, and for bacteriological, pathological, and biochemical laboratories. Two medical officers will reside on the premises. The following medical consultants will act as an honorary advisory committee: Dr. H. Moreland McCrea (chairman), Sir G. Lenthal Cheatle (vice-chairman), Dr. A. P. Beddard, Mr. W. R. Bristow, Mr. H. D. Gillies, Mr. W. G. Howarth, Mr. H. Tyrrell Gray, Prof. J. W. H. Eyre, Dr. Bertram Shires, Mr. A. H. Levy, and Mr. A. Pallant.

It is hoped that eventually it will be possible to devote a proportion of the profits to the provision of facilities for research. In the proposed memorandum

of association Section (6) reads: To provide facilities for the study and prevention of disease and to promote information on medical subjects by lectures, discussions, books, correspondence with public bodies and individuals or otherwise, and also to encourage the study and prevention of disease, and for that purpose to make donations on such terms and conditions as may from time to time be prescribed of a prize or prizes or other rewards or distinctions.

FIG. 2.



Map of neighbourhood showing position of the new building.

The Financial Side.

The company has a capital of £250,000, which is to be subscribed privately.

From the figures set out in the prospectus, which have been based on an 85 per cent. occupancy, we gather that the estimated revenue from all sources is £118,700, and the estimated annual expenditure £85,000. This would leave a net income of £33,700 which would be subject to income-tax and would be available for dividends on the £117,500 preference shares (7 per cent.) now to be issued, and then for distribution of dividends on the ordinary share capital of £125,000, and for contributions to research and to a reserve fund. An insurance scheme has been arranged for the completion of the purchase of the building; after the expiration of 25 years a sum of £15,300, comprising the annual interest and premium charge, will be added to the profits, which, according to the estimates, would then represent approximately 41 per cent. of the revenue.

Shareholders in the company will be provided with forms of recommendation in proportion to their holdings. Other considerations being equal, patients so recommended will as far as possible be given priority of admission.

It is not stated what fees it is proposed to charge for beds, and whether medical and specialist services are to be included or to be arranged separately. Many other questions will suggest themselves to our readers and will doubtless be answered shortly by a more detailed account of the scheme than is available in the prospectus submitted to us.

MANCHESTER ROYAL INFIRMARY.—The governors of the East Lancashire Homes for Disabled Sailors and Soldiers have resolved to hand over Grangethorpe Hospital as a free gift to the Manchester Royal Infirmary on condition that the institution remains an orthopædic hospital for the treatment of ex-Service men referred there by the Ministry of Pensions. The chairman of the infirmary has accepted the gift on behalf of the board of management. Grangethorpe cost £11,000 in 1918, and it is stated that since that date the Government have spent sums amounting to £100,000 on the erection of wards and reception huts in the extensive grounds for the patients. The date on which the Ministry of Pensions will relinquish control is not yet fixed.

Correspondence.

"Audi alteram partem."

INSOLATION AND PULMONARY TUBERCLE.

To the Editor of THE LANCET.

SIR,—From the letters of "M.R.C.S." and Dr. F. R. Walters on "insolation" in pulmonary tuberculosis (THE LANCET, Sept. 15th, p. 580; 22nd, p. 630), it is not quite clear what they actually mean by this term. If "insolation" means exposure to hot summer sunshine in ordinary clothing for any length of time, such as the usual sanatorium midday rest hour, I am in complete agreement with them about its dangers. When a patient has an unexpected evening temperature in the summer time, it has long been my custom to ask if he has been sitting in the sun for any unusual time. My own pulmonary patients are not allowed to be in the sun for their rest hour, unless actually carrying out heliotherapy.

It would appear, however, that some confusion exists between the effect of "insolation," as defined above, and the effect of properly conducted heliotherapy. The one is undoubtedly often harmful, the other has proved in my own hands of undoubted benefit. In those cases in which fever can be controlled by rest, heliotherapy can generally be employed without any of the ill-effects usually ascribed to it. The one great precaution, as with any treatment, is adequate control. The explanation of this apparent contradiction in the effect of sunshine is probably that in the one case the body is grossly overheated, exposure being followed by depression and even reactivation of disease; in the other the body is kept from overheating by the cool circulating air (or preferably wind), exposure producing a sense of well-being apparently followed by increased resistance.

Whilst heliotherapy is little used in other sanatoria for pulmonary tuberculosis in this country, the use of powerful carbon arcs in small ill-ventilated and over-heated rooms is fairly common, a method of treatment perilously akin to "insolation." I should like to take this opportunity of emphasising the importance, when administering any form of light treatment to pulmonary cases, of proper pulse and temperature records, before and after exposure, and of avoiding sweating. When carefully administered and controlled, I believe that both natural and artificial light play an important part in the treatment of pulmonary tuberculosis.

I am, Sir, yours faithfully,

J. E. WOOD,
Medical Superintendent, King George's Sanatorium for Sailors, Liphook, Hants.

Sept. 26th, 1928.

SUPRARENAL APOPLEXY.

To the Editor of THE LANCET.

SIR,—In your annotation last week on a paper by F. Pearl and H. Brunn it is stated that "any combination of symptoms may form the clinical picture, but asthenia is the most constant and characteristic of all symptoms." The subject is discussed fully in my recent book, "Fever, Heat Regulation, Climate, and the Thyroid Adrenal Apparatus," where it is shown, with references to the literature, that the condition is frequently associated with a sudden pyrexia. The condition then simulates an acute infection in its symptoms, and if the patient dies in that condition it has frequently been wrongly diagnosed as such—e.g., purpuric small-pox, scarlatina. Sometimes the fever may subside, to be followed by a subnormal temperature and asthenia, or the asthenia may be the first symptom which has been noticed.

I am, Sir, yours faithfully,

London, Sept. 28th, 1928. W. CRAMER.

THE BERLIN FOOD EXHIBITION.

To the Editor of THE LANCET.

SIR,—Some impressions gathered during the closing days of this exhibition may be of general interest. It was in truth a great exhibition. According to the *Berliner Tageblatt* upwards of three million visitors passed the turnstiles during the comparatively brief period of 100 days for which it was open. The success, comments that journal, is the more remarkable, seeing that the educational character was maintained throughout and no pleasure features were included. The nearest approach I saw to an exception to this rule was an enormous pig, two years old and weighing 305 kilos, and a sow of the same age, but 45 kilos heavier. The former slept all day, refusing to be aroused by my companion's missiles. The expenses of the scientific section were heavy. It has, however, fufilled its mission of enlightening the public—witness the reports appearing in home and foreign journals, and the enthusiastic testimony of representatives of hundreds of organisations of all kinds.

By the courtesy of the authorities, and of Herr Redakteur Teich-Balgheim in particular, the invaluable services of Dr. Munchhauser, the head of the scientific section, were placed at my disposal. In him I had an expert guide of great experience, for it was he who organised the Düsseldorf Exhibition of a few years ago. When recalled to his post his place was taken by Dr. Ohler. It was likewise my good fortune to meet Dr. Max Winckel, the editor of the *Volks-Ernährung*, with whom, I understand, the idea of the exhibition originated, and through whose exertions the municipality of Berlin, in common with the German and Prussian Government departments concerned, was induced to participate.

The scientific section consisted in large measure of exhibits lent by the German Hygiene Museum at Dresden, which was formed as an outcome of the famous exhibition held in that city in 1911. To visit it, Prof. Irving Fisher, of Yale University, U.S.A., whose standing as an authority upon all questions relating to health (he was a member of the Commission on the Conservation of National Resources appointed by President Roosevelt, besides being adviser to the Life Insurance Company, of New York, and other bodies) is well-nigh as high as on his own subject of economics, made a special journey across the Atlantic. Moreover, on his arrival in this country, after a week's stay in the Saxon capital, he assured me that he had been amply rewarded. The most important exhibits were in the section entitled Der Mensch und seine Ernährung, which achieved much educational work. During June the exhibition was visited by enormous numbers of school-children, while, as its last few days witnessed the reassembling of the schools, numerous classes, headed by their teachers, were encountered in the course of my peregrinations. Guides in the same section, obtainable for a modest fee, lectured on the exhibits to large and evidently keenly interested audiences. Home truths were apparently included in the informal talks, for one guide was overheard telling his hearers that "Germans take much more meat than the French and less vegetables." Scientific addresses were given by Dr. Winckel to some 3000 teachers of household economy. Special visits were also arranged. Thus, on the day of my first visit, the hotel proprietors and chefs of the city had been invited, to whom Dr. Winckel spoke on Uncooked Food, its Value and Use.

With a solicitude that other promoters of exhibitions would do well to emulate, comfortable straw chairs were placed in clumps throughout the scientific section, so that single exhibits might be studied, and the delicate or weary rest. The four halls were so vast that though the average attendance on each of the last week days was 30,000—the official figure for the final Sunday but one was 50,000—no undue crowding or inconvenience was experienced. Visitors included all sorts and conditions of people. There were, of course, great numbers of housewives, usually accompanied by their men folk, and young couples by the score. For both these categories the exhibition will often doubless mark the opening of a new era, in their knowledge of all that appertains to health in its broadest sense. Then there were Red Cross and other nurses, as well as a group of peasants with quaint head-dresses reminiscent of Brittany. The crowd was well dressed and singularly orderly. I did not remark a single individual the worse for liquor. The cloak-rooms—a weak spot in so many exhibitions, as I can testify from large experience—were numerous and cleanly, while the restaurants were not merely, as might have been expected, far above the average in the quality and variety of the fare provided, but so numerous and conveniently placed that a visit seldom entailed delay.—I am, Sir, yours faithfully,

CHARLES E. HECHT, M.A.,
Hon. Sec., Food Education Society.

29, Gordon-square, London, W.C., Sept. 29th, 1928.

Medical News.

UNIVERSITY OF MANCHESTER.—At recent examinations the following candidates were successful:—

DIPLOMA IN PUBLIC HEALTH.

Part I.—Martin Naughton and Josephine Walmsley.

Part II.—Georgie I. Brodie, T. S. Hanlin, Harold Harrison, Martin Naughton, Jean M. Orkney, J. S. Smith, and Margaret Sproul.

DIPLOMA IN PSYCHOLOGICAL MEDICINE.

Part I.—H. A. Palmer.

UNIVERSITY OF LONDON.—The Semon Lecture, entitled Laryngo-Rhinology and General Medicine, will be given by Prof. Markusz Hajek, professor of oto-rhino-laryngology in the University of Vienna, in the Barnes Hall of the Royal Society of Medicine on Thursday, Nov. 1st, at 5 P.M.

As we have already announced, a course of three lectures on Smoke Pollution of the Air and Public Health will be given by Dr. John S. Owens, at University College, on Nov. 2nd, 9th, and 14th, at 5.30 P.M.

At 5.30 P.M. on Wednesday, Nov. 7th, a lecture on the Human Factor will be given at University College by Mr. F. A. P. Aveling, Ph.D., reader in psychology in the University; and at the same hour on Nov. 14th Dr. R. J. S. McDowall, professor of physiology in the University, will speak on Physiology and National Efficiency. These lectures form part of a series on the Indebtedness of Industry to Pure Science.

A course of six lectures on Urinary Secretion will be given by Dr. E. B. Verney, professor of pharmacology in the university, at University College, at 5 P.M., on Mondays, Oct. 15th, 22nd, and 29th, and Nov. 5th, 12th, and 19th.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—The annual Neech Prize for the best paper read before a branch or group of the society has been awarded for 1926–27 to Dr. J. A. H. Brincker for his communication on the Case for Diphtheria Immunisation, delivered to the metropolitan branch of the society.

RADIUM CENTRE OF THE METROPOLITAN ASYLUMS BOARD.—A new centre for the treatment of uterine cancer by radium at the North-Western Hospital, Hampstead, will be in the charge of Mr. Comyns Berkeley. The method generally to be followed will be that developed at the Radiumhemmet in Stockholm by E. J. Heyman. The Metropolitan Asylums Board will be responsible for transport of patients to and from the centre, either from the poor-law institution or from the patient's home. Patients suffering from cancer either of the cervix or of the body of the uterus will be accepted. General anæsthesia of short duration is induced for each of the insertions of radium. The Metropolitan Asylums Board is prepared on the advice of the medical director of the centre to accept patients believed to be suffering from cancer of the uterus on clinical diagnosis only. In such cases it is particularly desirable that there should be no disturbance of the growth for the purpose of diagnosis either by curettage or removal of tissue. Radium treatment only will be undertaken at the centre, and the Board may refuse treatment to any patient considered unsuitable by the medical director. Periodical reports on the work of the centre will be published.

MEDICAL OFFICERS OF SCHOOLS ASSOCIATION.—A meeting will be held at 11, Chandos-street, Cavendish-square, London, W. 1, on Oct. 19th, at 5 P.M., when Surg.-Commander S. F. Dudley will read a paper on Microbic Dissemination in Schools.

ELIZABETH GARRETT ANDERSON HOSPITAL: *Post-graduate Classes.*—Instruction in clinical pathology, bacteriology, and biochemistry may be obtained in the pathological department of this hospital by medical women during October and November. Particulars of the hours and fees may be had from the secretary.

CHILD-STUDY SOCIETY.—The programme for the session has now been issued. At the Royal Sanitary Institute, 90, Buckingham Palace-road, London, S.W., at 6 P.M. on Oct. 11th, Dr. Letitia Fairfield will speak on Child Study in America. On Oct. 25th, at the same time, Dr. C. J. Thomas will discuss Child Study and the Health of the Child; and on Nov. 8th Mr. Percy C. Buck, Music and the Child-Mind.

HUNTERIAN SOCIETY OF LONDON.—The next session will open on Oct. 15th, when Dr. A. Westerman will deliver his presidential address on Gleanings from the Minutes (1907-1928) at 7.30 P.M. At the meeting on Nov. 5th the subject of discussion will be the Doctor on the Stage, to be opened by Dr. Harold Dearden, Dame Madge Kendall, Sir StClair Thomson, Miss Lena Ashwell, and Mr. Ivor Back. On Dec. 3rd a discussion on the Artificial Termination of Pregnancy will be opened by Mr. C. S. Lane-Roberts and Mr. A. McAlister. On Jan. 14th, 1929, the lecturer will be Prof. Putti, of Bologna. On March 4th the Hunterian Oration will be delivered by Prof. A. W. Sheen on Some Aspects of the Surgery of the Spleen. On March 25th a discussion on Blood Pressure in Health and Disease will be opened by Dr. Halls Dally, Dr. Edgar Obermer, and Dr. Temple Grey.

ST. BARTHOLOMEW'S HOSPITAL.—The session was opened by a gathering of old students, who dined together in the Great Hall. Sir D'Arcy Power, consulting surgeon to the hospital, who was in the chair, said that though there was no formal toast list he was expected to give a short account of events since they last met. Sir William Church and Sir Dyce Duckworth, two of the consulting physicians, had died full of years and honours. Both were typical products of the hospital—cultured gentlemen, known, respected, and trusted throughout England not only by their professional colleagues, but by all with whom they were brought in contact. Mr. Douglas Harmer had resigned his charge of the throat department, an office he had held for upwards of 25 years. Bart.'s men wished him long life and health to carry out some of the many problems in his branch of surgery which still await solution. During the year an active part had been taken by the hospital and medical school in celebrating the 300th anniversary of the publication of "De Motu Cordis," written by Dr. William Harvey, a former physician to the hospital. Foreign delegates bidden to luncheon in that Hall came in their hosts. Many of them, said Sir D'Arcy, confessed to him afterwards that what they suffered from the unaccustomed food was more than recompensed by the surroundings and by Sir Wilmot Herringham's oration. The occasion was further improved by the publication of the first English version of Harvey's immortal work, under the editorship of Mr. Geoffrey Keynes. Building, he said, had gone on as usual throughout the year. The nurses were now properly housed, and the Isla Stewart recreation room, nearly finished, would be a worthy memorial to a great matron. The new surgical block was rising steadily and it would be easy to think, when watching it, that the hospital was being improved out of all knowledge. It was no so, for as far back as records went there was proof of continuous changes in the buildings. At no time had there been any finality; successive treasurers and governors had always seen to it that the hospital should be a little in advance of the times, especially in providing for the sick poor of London. The present building had, alas, diminished his respect for the truthfulness of Rahere, Prior and builder of the church and hospital more than 800 years ago. When Rahere begged the land from King Henry I. he said it was a marsh with water abounding everywhere and the gallows occupied what little dry land there was. "Go and look at the ground dug out for the foundation of the new block," said Sir D'Arcy. "It is a beautiful dry sand with abundant gravel—and Rahere knew it, for he built his church without deep foundations and without piles, where it stands unmoved to this day. Like the buyer of old, he said to the King, it is nought, it is nought, and then went his way and boasted." Finally the year had been memorable in athletics because after many hard fights the inter-hospital football cup had returned to the keeping of the medical school, for the fourth time, but after a long interval.

WESTMINSTER HOSPITAL.—The annual dinner of this hospital was held at Gatti's Restaurant, Strand, on Oct. 1st, when Sir James Purves-Stewart took the chair. After the loyal toast Lieut.-Colonel H. C. Bulkeley proposed "The School," and the Dean, Dr. A. S. Woodwark, replied. He said that numerically the position of the school was admirable; examination results had also been satisfactory, and during the last two years over 60 students had qualified. A sign of great promise was the growing interest of the school in social activities and athletics; a Rugby team was to be restarted this season. The pioneer activities of the hospital with radium had drawn to it the attention of workers in all parts, and the staff of the Carlill Research Laboratories had performed important work. The chairman, in proposing the Health of Past and Present Students, said that the hospital would stand or fall by the qualities of the junior members of the staff and of the young graduates who went out from it year by year. Dr. H. H. Mills praised famous men and women of the hospital's past, and pleaded for the solution of the maternal morbidity problem by teamwork. Mr. C. G. Roberts, for the present students, pitied his friends who had gone to hospitals which did not pay such close attention as did the Westminster to turning out finished, practical doctors. Proposing The Guests, Mr. Arthur Evans appealed for funds to acquire adjacent land on which to build accommodation for paying patients. The project, he argued, should appeal strongly to insurance companies, who would benefit greatly if the expectation of life among the middle classes were increased. Mr. Arnold Powell, headmaster of Epsom College, replied, and Dr. Arnold Stott gave the toast of The Chairman.

MIDDLESEX HOSPITAL DINNER.—On Tuesday evening Prince Arthur of Connaught presided over the annual dinner at the Savoy Hotel. In proposing the toast of the Hospital and Medical School he spoke of the courage with which the reconstruction of the buildings had been faced, so that a seeming disaster had served as an incentive to fresh endeavour. There had been not only reconstruction but also development. The building of the new west wing was nearing completion, the central boiler-house was ready to satisfy all branches of the hospital's services, the Courtauld Institute of Biochemistry was humming like a hive of bees, and the first section of the new nurses' home would be open within 12 months. The scheme of development contained one particular feature, however, which had hitherto not been realised. This was the provision of a block for paying patients, and the financial outlook for this had been gloomy. He was proud to be able to say that a friend of the hospital, Lord Woolavington, had come forward with a gift of £125,000 for this purpose, which would ensure that the new Middlesex Hospital would be new not only in fabric and equipment but would also include in its service those who had so far been shut out from its benefits. Responding for the hospital Mr. S. A. Courtauld said that he felt that the future of the reconstruction scheme was now assured. He regarded the great national hospitals as missionaries as well as guardians of the nation's health. Mr. Eric Pearce Gould, who replied, as dean of the medical school, began by saying that no hospital could now be considered complete that did not make some provision for paying patients. He then went on to speak of the retirement of Mr. John Murray from the surgical staff, referring to the value to the school of his assiduous teaching of surgery. He hoped that in his retirement Mr. Murray would not be haunted by visions of students in plus fours, smoking cigarettes, scattering tobacco ash on his billiard table, and chattering of T.B. and acute abdomens. In conclusion, after a passing reference to genius as "10 per cent. inspiration and 90 per cent. perspiration," Mr. Pearce Gould accorded a warm welcome to Mr. R. Vaughan Hudson as a new member of the staff and spoke in modest terms of his own retirement from the post of dean. The last response to the toast was given by Dr. G. H. Dobney, as Broderip Scholar, after which Dr. H. MacCormac proposed the Guests. In the course of his reply Surgeon Vice-Admiral Gaskell, Medical Director-General of the Navy, said that the hospital seemed to have become a magnet for gold, and congratulated the Medical School on having sent some very fine officers into the Navy. Dr. Ainley Walker, dean of the Faculty of Medicine of the University of Oxford, said that he was often asked which was the best hospital in London. His hearers all knew perfectly well which was the best hospital in London, but the question always placed him in a difficult position as he had perfectly frank and unbiased statements from the dean of nearly every medical school to the effect that his was the best and that it was particularly suited to the temperament of senior students from the older universities, either because it was so large, so moderate in size, or so small. The final toast, The Chairman, was proposed by Mr. R. L. Hunter and was drunk with musical honours, after which Prince Arthur wittily replied, assuring those present that he really did think he was beginning to feel healthier already.

LONDON HOSPITAL MEDICAL COLLEGE. — The Schorstein Memorial Lecture, on Expectoration, will be delivered by Dr. Cecil Wall on Nov. 2nd, at 4.15 P.M., in the Bearsted Clinical Theatre.

ROYAL DENTAL HOSPITAL.—The medical committee will be at home to past and present students of the hospital on Oct. 20th from 10 A.M. to 5 P.M. Medical practitioners also are invited to attend. In the morning the various departments of the hospital and school will be open, and demonstrations will be given by members of the staff. In the afternoon orthodontic and other cases of special interest from the clinic of the hospital will be shown.

INTERNATIONAL SOCIETY OF MEDICAL HYDROLOGY. As we have already announced, this Society is holding its annual meeting in England, from Oct. 9th to 17th, under the presidency of Lord Dawson. The proceedings will begin with a reception at the Royal Society of Medicine on the evening of Tuesday the 9th, and on Wednesday morning, at 10 A.M., the members will meet at the Jehanghir Hall of the University of London, South Kensington, where they will be officially welcomed by Sir Gregory Foster as Vice-Chancellor, by Dr. Alison Glover on behalf of the Ministry of Health, and by Sir Holburt Waring for the Faculty of Medicine. The subsequent discussion will be devoted to the State, the Health Resort, and National Health Insurance, and on the next day there will be a meeting at 5 P.M. at the rooms of the Linnean Society in Burlington House, to consider the Humoral Factor in Disease. After this the party will go to Harrogate and Buxton, where the principal subjects under consideration will be the Treatment of Children by Waters and Baths, and Rheumatism as a National Problem. All members of the medical profession are invited to attend the meetings, further particulars of which will be found in our Medical Diary.

THE LATE DR. JULIUS MOORE.—Dr. Moore, who died at his home at Enfield on Sept. 25th after a short illness, was in his fifty-sixth year. Born at Rochester, Kent, he received his medical education at Guy's Hospital, taking the conjoint diploma and M.B. Lond. in 1897, and the M.D. Lond. in 1901. After practising for a short time at Farnborough, Hants, he entered into partnership at Enfield, where he held appointments as surgeon to Y Division Metropolitan Police, to the Post Office, and to the Metropolitan Water Board. In spite of the urgent claims of a large general practice he found time in recent years to take up ear, nose, and throat work, and he devoted much time to the Enfield War Memorial Hospital, of which he became medical manager. Dr. Moore's early death is ascribed to his devotion to his patients, and the attendance at the funeral service at St. Mary's, Enfield, bore witness to the affection felt towards him by his professional colleagues and all classes of the community. He leaves a widow but no children.

MEDICAL DEFENCE UNION.—The annual general meeting was held at the Norfolk and Norwich Hospital on Sept. 29th, Sir Herbert Waterhouse presiding. In proposing the adoption of the report, Sir Herbert said that during the past year the Union had had to defend an unusually large number of High Court actions, and had only lost one case. Fractures of the neck of the femur had given the greatest anxiety; these cases alone had cost the Union over £1400. Claims were nearly always based on alleged negligence in that an X ray examination was not advised, and unless the Union was in a position to prove that such advice had been given, defence became difficult or impossible. Allegations of negligence did not arise as a rule until the doctor's account was sent in; careful notes of the condition when the patient was first seen and of the progress from day to day were of primary importance. The membership of the Union had increased, said Sir Herbert, from 12,916 in 1925, when he became president, to its present figure of 15,474. Available funds had increased during the same period from £36,723 to £57,810. The policy had been for some years to build up a substantial reserve fund, so as to be in a position, if necessary, to carry a case to the House of Lords, and investments now amounted to £35,000. Women doctors were joining the Union in increasing numbers; at present there were about 1400 women members. They were liable to much the same attacks as men: cases of alleged negligence, malpraxis, libel, and slander had been dealt with. Women acting as assistants had been unfairly treated, and women had been wrongfully dismissed from appointments. In one case a woman doctor had been accused of immoral conduct, and a complete withdrawal of the monstrous allegation was obtained. Many newly registered women doctors, said Sir Herbert, had impressed the Union as being curiously ill-informed on partnership agreements, the purchase of practices, and such matters. He strongly urged them before taking any appointment, partnership, or practice, to avail themselves of the help of the general secretary of the Union, who was ready to advise on all matters connected with medical practice. The report of the Council and the financial statement for the year 1927 were adopted unanimously. Dr. W. S. A. Griffith, Dr. V. A. Jaynes, and Mr. F. C. Larkin, the retiring members of Council, were re elected.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
MONDAY, Oct. 8th.—5 P.M., WAR. Presidential Address: Lieut.-General Sir Matthew Fell: The War Section.
TUESDAY.—5 P.M., THERAPEUTICS. Presidential Address: Prof. J. A. Gunn: Cardiac Stimulants. Members of the Section are invited to take part in the subsequent discussion.
THURSDAY.—8.30 P.M., NEUROLOGY. Presidential Address: Mr. Donald Armour: Some Considerations on Head Injuries.
FRIDAY.—5.30 P.M., CLINICAL. (Cases at 5 P.M.) *Cases:* Dr. C. Worster-Drought: (1) Case of Acromegaly with Progressive Muscular Atrophy. Mr. H. C. Edwards: (2) Case of Syphilitic Disease of the Radius. Dr. C. F. T. East: (3) A Case of Obscure Anæmia. (4) Case of Tricuspid Regurgitation and Pulsating Liver. Dr. J. H. Easton: (5) Case of Traumatic Cyst of Face. (6) Case of Multiple Exostoses. Dr. R. Cove-Smith: (7) Case of Myelocytic Leukæmia. Mr. Cecil P. G. Wakeley: (8) Case of Bilateral Pseudocoxalgia. Dr. I. M. Allen: (9) Case of Meningioma of Sensory Cortex (after removal). Dr. W. Salisbury Sharpe: (10) Case of Goundou occurring in London. 8.30 P.M., OPHTHALMOLOGY. (Cases at 8 P.M.) Presidential Address: Mr. Cyril H. Walker: Some Recent Changes in the Incidence of Ophthalmic Diseases. *Paper:* Mr. E. Wolff: Report on a Case of a Large Implantation Cyst of the Conjunctiva, with Illustrations and Pathological Report.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, W.
MONDAY, Oct. 8th.—8. P.M., Annual General Meeting. 8.30 P.M., Dr. J. W. Carr: Presidential Address, Medical Ambitions and Ideals.

INTERNATIONAL SOCIETY OF MEDICAL HYDROLOGY.
WEDNESDAY, Oct. 10th.—At the University of London (Jehanghir Hall), 10 A.M.: Discussion, The State, the Health Resort and National Health Insurance. Lord Dawson in the chair.
THURSDAY.—At the Rooms of the Linnean Society (Burlington House), 5 P.M.: Discussion, The Humoral Factor in Disease: neo-Hippocratism.
SATURDAY.—At Harrogate: Discussion, The Treatment of Children by Waters and Baths.

BIOCHEMICAL SOCIETY.
SATURDAY, Oct. 6th.—2.30 P.M. (in the Biochemical Laboratory, Cambridge), Sir F. G. Hopkins: The Centenary of Friedrich Wöhler's Synthesis of Urea. *Communications*: A. V. Szent György (introduced by F. G. Hopkins): Functions of Peroxidase Systems, and Chemistry of the Adrenal Cortex. E. H. Lepper and C. J. Martin: A Thermostable Autoxidisable System Comprised of Boiled Muscle and Hæmochromogen. B. Woolf: The Estimation of Ammonia, Urea, and Total Nitrogen. F. Temple Grey: The Behaviour of Glucose in Urine. T. A. Webster and R. B. Bourdillon: Observations on the Irradiation of Ergosterol. A. S. Parkes and G. F. Marrian: Observations on the Distribution of Oestrin. H. D. Kay and P. G. Marshall: The Second Protein (livetin) of Egg-Yolk. E. Stedman: The Miotic Activity of the Urethanes Derived from the Isomeric Hydroxybenzyldimethylamines. H. J. Holman and S. B. Schryver: The Separation of the Basic Products of the Hydrolysis of Proteins. L. J. Harris: The Zwitterion Constitution of the Amino-acid Molecule. Titration Curves of Methylene Derivatives.

SOCIETY FOR THE STUDY OF INEBRIETY.
TUESDAY, Oct. 9th.—4 P.M.: in the Rooms of The Medical Society of London, 11, Chandos-street, Cavendish-square, London, W. Dr. Hubert J. Norman will open a Discussion on Alcohol and Drug Addiction in Relation to Mental Disorders.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.
MONDAY, Oct. 8th, to SATURDAY, Oct. 13th.—BETHLEM ROYAL HOSPITAL, St. George's Fields, Lambeth, S.E. Tues. and Sat. at 11 A.M.: Lecture-demonstration on Psychological Medicine.—CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C. Intensive course—three weeks' duration.—CHELSEA HOSPITAL FOR WOMEN, Arthur-street, S.W. Special Course in Gynæcology.—LONDON SCHOOL OF TROPICAL MEDICINE, Endsleigh-gardens, W.C. Tues. and Thurs. at 2 P.M.: Lecture-demonstrations.—ROYAL FREE

HOSPITAL, Gray's Inn-road, W.C. Wed.: Lecture-demonstration by Dr. Heald.—ROYAL WATERLOO HOSPITAL, Waterloo-road, S.E. Tues. at 2.30 P.M.: Dr. Gerald Slot (Rheumatism).—WELLCOME MUSEUM OF MEDICAL SCIENCE, 33, Gordon-street, W.C. Wed. at 4 P.M.: Demonstration by Dr. S. H. Daukes: A Synoptical Museum of Medicine—Its Value for Post-graduate Study. Further information from the Secretary.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.
MONDAY, Oct. 8th.—10 A.M., Dr. Dowling: Skin Department. 11 A.M., Mr. Tyrrell Gray: Surgical Wards. 2 P.M., Mr. Simmonds: Surgical Out-patients.
TUESDAY.—11 A.M., Mr. Endean: Venereal Diseases (Demonstration). 2 P.M., Dr. Shaw: Medical Out-patients. 4.30 P.M. (Special Lecture) Dr. Scott Pinchin: Difficulties in Diagnosis of Pulmonary Tuberculosis.
WEDNESDAY.—10 A.M., Dr. Burnford: Medical Wards. 2 P.M., Mr. Tyrrell Gray: Operations. 2.30 P.M., Mr. Donald Armour: Surgical Wards.
THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Department. 2 P.M., Dr. Ironside: Medical Out-patients. 2 P.M., Mr. Bishop Harman: Eye Department. 4.30 P.M. (Special Lecture): Mr. Tyrrell Gray: Gastric and Duodenal Ulcer.
FRIDAY.—10 A.M., Dr. Pritchard: Medical Wards. 2 P.M., Mr. Sinclair: Surgical Out-patients. 2 P.M., Mr. Vlasto: Throat, Nose and Ear Department.
SATURDAY.—9 A.M., Mr. Vlasto: Operation on Throat, Nose and Ear. 9.30 A.M., Dr. Burnford: Bacterial Therapy Department. 10 A.M., Dr. Owen: Medical Diseases of Children.
Daily 10 A.M. to 5 P.M., Saturdays 10 A.M. to 12 noon. Medical and Surgical In-patients and Out-patients. Operations, Special Departments, Anæsthetic Course.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
MONDAY, Oct. 8th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.
TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Throat, Nose and Ear Clinics. Operations.
WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin and Eye Clinics. Operations.
THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, and Ear, Nose and Ear, Nose and Throat Clinics. Operations.
FRIDAY.—10.30 A.M.: Throat, Nose and Ear Clinics. 2.30 to 5 P.M.: Surgical, Medical, and Children's Diseases. Clinics. Operations.

LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.
TUESDAY, Oct. 9th.—5 P.M.: Dr. W. N. Goldsmith: Anatomy and Physiology of the Skin.
THURSDAY.—5 P.M. Dr. J. M. H. MacLeod: Morphology and Histopathology of Elementary Lesions.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.
THURSDAY, Oct. 11th.—4 P.M., Dr. Payne: Nephritis from the Biological Standpoint.

ROYAL NORTHERN HOSPITAL, Holloway-road, N.
TUESDAY, Oct. 9th.—3.15 P.M.: Dr. C. C. Beatty: Anæmia.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.
TUESDAY, Oct. 9th.—4.15 P.M., Mr. J. Howson Ray: Torsion of the Omentum.
FRIDAY.—4.15 P.M., Dr. C. H. Melland: Diagnosis, Prognosis, and Treatment of Pernicious Anæmia.

ANCOATS HOSPITAL POST-GRADUATE LECTURES, Mill-street, Manchester.
THURSDAY, Oct. 11th.—3.45 P.M., Dr. W. J. S. Reid: Diseases of Sympathetic Nervous System.

Appointments.

GARROW, R. P., M.D., Ch.B. Aberd., D.P.H., has been appointed Medical Officer of Health for Hornsey.
KEANE, D. J., L.R.C.P. & S. Irel., Medical Officer for Moone, Co. Kildare, Dispensary District.
OWEN, R. D., M.R.C.S., L.R.C.P. Lond., F.R.C.S. Edin., Honorary Surgeon to the Ear, Nose and Throat Department of Cardiff Royal Infirmary.
RUSSELL, GLADYS, J. C., M.B., Ch.B. St. And., Assistant Medical Officer for Maternity and Child Welfare, Leeds.
Certifying Surgeons under the Factory and Workshop Acts: DICKENSON, G. O. M., M.B., B.S. Durh. (Olney, Bucks): HOLMES, J., M.B., B.Chir. Camb. (Southport): HUGHES, E. L., M.B. Ch.B. N.U.I. (Hawes, N. Riding); and MCINTOSH, W. J. M.B., Ch.B. Glasg. (Youlgreave, Derby).

Vacancies.

For further information refer to the advertisement columns.

Bethlem Hospital, Lambeth-road, S.E.—Two H.P.'s. Each £25 per quarter.
Birmingham, Birmingham and Midland Ear and Throat Hospital, Edmund-street.—Asst. S.
Birmingham, Dudley-road Hospital.—H.S. At rate of £200.
Bolingbroke Hospital, Wandsworth Common, S.W.—H.P. £120.
Brentwood, Essex, High Wood Hospital for Children.—Second Asst. M.O. £550.
Burnley County Borough.—Asst. M.O.H., &c. £600.
Bury County Borough.—Asst. M.O.H., &c. £600.
Cardiff Royal Infirmary.—Gynæcological H.S. At rate of £50.
Coventry Voluntary Infant Welfare Centres.—Part-time M.O. £250.
Derby, Derbyshire Royal Infirmary.—Asst. H.S. and Cas. O. At rate of £150.
Dover, Royal Victoria Hospital.—H.S. £180.
Dunedin, New Zealand, Otago University.—Professor of Pathology. £1000.
East Kilbride, Hairmyres Sanatorium and Colony.—Asst. Res. P. £250.
East London Hospital for Children, &c., Shadwell, E.—H.S. At rate of £125.
Essex County Council.—Male Asst. Tub. O. £700.
Folkestone, Royal Victoria Hospital.—Jun. Res. M.O. At rate of £100.
Gloucester, Standish House Sanatorium, Stonehouse.—Asst. M.O. £250.
Halifax, Royal Halifax Infirmary.—3rd H.S. At rate of £100.
Hampstead General and North-West London Hospital, Haverstock-hill, N.W.—H.S. Also Cas. M.O. and Cas. Surg. O. Each at rate of £100.
Hertford County Hospital.—H.P. At rate of £150.
Hospital for Consumption, &c., Brompton, S.W.—H.P. At rate of £50.
King Edward Memorial Hospital, Ealing, W.—Sen. Res. S. £150.
Leeds City.—Asst. M.O. for Maternity and Child Welfare. £600.
Leicester Royal Infirmary.—Surgical Dressership.
Lincoln County Hospital.—Jun. H.S. At rate of £150.
L.C.C. Mental Hospital Service.—Eighth Asst. M.O. £300.
Manchester, St. Mary's Hospitals.—Four H.S.'s. Each at rate of £50.
Northampton General Hospital.—Asst. H.S. to Ear, Nose and Throat Dept. At rate of £150. Also Hon. Dental S.
Paddington Green Children's Hospital, W.—H.S. At rate of £150.
Princess Louise Kensington Hospital for Children, N. Kensington. H.P. At rate of £75.
Prison Medical Service.—M.O. £350.
Richmond, Surrey, Royal Hospital.—Hon. Asst. Ophth. S.
Royal Chest Hospital, City-road, E.C.—Res. M.O. Also H.P. At rate of £150 and £100 respectively.
Royal Free Hospital, W.C.—Sen. Asst. and Third Asst. to Obstetrical and Gynæcological Unit. £350 and £270 respectively.
Royal National Orthopædic Hospital, 234, Gt. Portland-street, W. Four Surg. Regs. Each £105.
Saint Mark's Hospital for Cancer, &c., City-road, E.C.—H.S. At rate of £75.
St. Bartholomew's Hospital, E.C.—Surgeon to Throat Dept. Also Asst. Dental S.
St. Thomas's Hospital, S.E.—Physician for Mental Diseases, &c.
Shanghai Municipal Council, Public Health Dept.—Second Asst. Commissioner of Public Health (Hospitals). £975.
Southampton, Royal South Hants and Southampton Hospital.—Jun. H.S. Also Cas. O. At rate of £130 and £120 respectively.
Wolverhampton, Wolverhampton and Midland Counties Eye Infirmary.—H.S. £200.

The Home Secretary gives notice of a vacancy for a Medical Referee under the Workmen's Compensation Act for the Island of Lewis (Sheriffdom of Ross, Cromarty, and Sutherland). Applications for the post should reach the Private Secretary, Scottish Office, Whitehall, S.W., not later than Oct. 20th.

Births, Marriages, and Deaths.

BIRTHS.

COLWILL.—On Sept. 29th, the wife of Dr. C. K. Colwill, of Barn Rise, Wembley Park, of a daughter.
MACDONNELL.—On Sept. 26th, at 89, Lower Baggot-street, Dublin (Nursing Home) the wife of J. J. MacDonnell, M.B., of a son.

MARRIAGES.

CORCORAN—O'REILLY.—On Sept. 12th, at the Servite Roman Catholic Church, London, Dr. John Corcoran, Sutton, Surrey, to Miss Eileen O'Reilly, "Tunstall House," Worcester Park, Surrey.
RAMSAY—WIMBLE.—On Sept. 22nd, at St. Matthew's Church, Oxhey, Watford, Robert Clement Burke Ramsay, B.A., M.B., B.Ch., of Bushey, Herts, to Averil Mary Florence (Molly), only child of Dr. and Mrs. H. C. Wimble, of Oxhey, Watford.
RICHARDS—EALES.—On Sept. 26th, at St. Paul's, Herne Hill, Douglas Oliver Richards, M.B., B.Sc., to Norah Alice, second daughter of the late Mr. and Mrs. John Eales, of Sydenham.

DEATHS.

MOORE.—On Sept. 25th, at "Cheriton," The Ridgeway, Enfield, Julius Moore, M.D., aged 55.
PATON.—On Sept. 30th, suddenly, at Wester Dawyck, Stobo, Peeblesshire, Diarmid Noel Paton, F.R.S., LL.D., M.D., &c., late Regius Professor of Physiology in the University of Glasgow, aged 70.
SHARPE.—On Sept. 28th, at Darley Dale, in his sleep, William Cecil Sharpe, M.D.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

OBSERVATIONS ON THE SELECTION AND STANDARDISATION OF SURGICAL INSTRUMENTS.

By A. H. Tubby, C.B., C.M.G., M.S. Lond.,
CONSULTING SURGEON, WESTMINSTER HOSPITAL.

I.*—The Standardisation of Surgical Knives.

Experienced surgeons have noticed the unequal cutting properties of surgical knives, both in hospital and private practice. It has frequently happened to a surgeon that in going over his reserve stock of knives he has been compelled to reject one after another, although they may, and usually have been, recently returned from the grinders as sharp and fit for service. Some are evidently made of so soft a steel that the edge turns at once, and others prove to be sharp enough to cut cleanly through soft tissues, but their edges are deflected when brought into contact with bone. A few, and, unfortunately, a very few of them, stand much wear and tear and repeated visits to the grinders; they are cherished accordingly. It is surprising that this state of affairs should have been tolerated for so many years when we reflect upon the extent of modern knowledge and the advances which have been made in metallurgy. We know that it is possible scientifically to follow every step in the manufacture of surgical knives, from the steel bar to the finished article, when the knife ought to be fit to be placed in the hands of the operating surgeon. Therefore I make this plea for the standardisation of the metal used and the process of its manufacture.

The materials from which all ordinary forms of cutting surgical instruments are made are carbon-steel and stainless or chromium steel. Surgical knives are made from carbon-steel, whereas many knives used for domestic purposes are manufactured from stainless steel. In order to understand the qualities of the carbon-steel knife, and the reasons for its being efficient or defective, we must describe its manufacture, each stage of which is capable of scientific examination and control. The stages are: (1) the composition of the carbon-steel and its microscopical structure; (2) the hardening process and its "critical" temperature; (3) the mode of tempering; (4) the manner of grinding; (5) the angle of the cutting edge.

Fig. 1a. Fig. 1b.

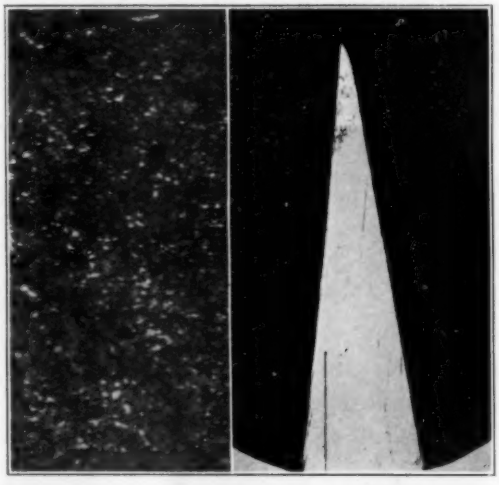


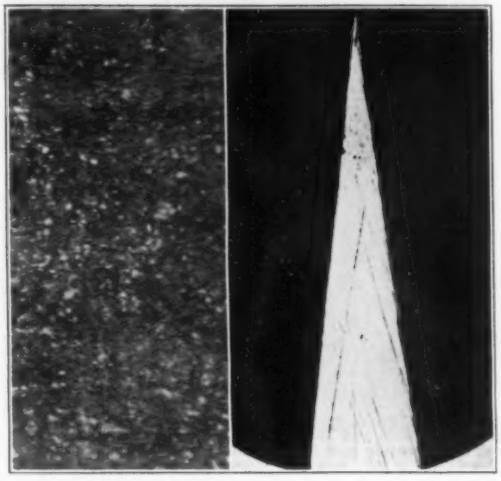
Fig. 1a.—Microscopical section of blade of knife No. 1 (× 500), showing the structure of the "pearlite." The white appearance indicates the pure or nearly pure iron, and the dark is the ferric carbide (Fe_3C). The Brinell hardness of this knife is 546, considerably below normal, and the structure of the pearlite should be compared with that seen in other figures. Its varied structure in the various figures emphasises variation in heat-treatment in the hardening process.

Fig. 1b.—The cutting angle of knife No. 1 (× 100). The cutting angle is 15°, rather greater than is desirable. This knife has been in use for over a year; it had recently been sent to be re-ground and sharpened; and the grinder has done his work well, in that he has not increased the cutting-angle of the blade to any appreciable extent.

* Part II. will appear in a coming issue.

I am indebted to Sir W. Ellis, G.B.E., Past Master Cutler of Sheffield, and managing director of Messrs. John Brown and Co., of that city, and to Mr. W. H. Hatfield, director of the Brown-Firth Research Laboratories, who have unreservedly placed their profound knowledge of this intricate subject at my disposal. They have given me opportunities of visiting the works and laboratories and have demonstrated to me the various processes which steel instruments undergo during manufacture; and they have been so good as to carry out researches and experiments at my suggestion, especially in the examination of surgical knives. In addition, they have determined the reactions of stainless steel to various chemical solutions and reagents used in surgery, and the effect of certain physical conditions to which instruments are exposed in the course of operating. I wish to tender to them my grateful acknowledgment.

Fig. 2a. Fig. 2b.



Figs. 2a (× 500) and 2b (× 100) (knife No. 2).—Brinell hardness index = 650—about normal. Note the more homogeneous appearance of the pearlite with the increased hardness. The cutting angle is 14½° and has not been increased in grinding.

The Composition of Carbon-steel used in the Manufacture of Cutting Instruments.

First-class cutlery is made from shear carbon-steel as distinct from cast carbon-steel. Both forms of steel, however, are made by the cementation or carbonisation of Swedish wrought iron. Dr. Hatfield thus describes the process:

"The blister bars produced in this way are either piled into faggots and hammered into bars to produce shear steel, or are broken up and melted in the crucible to produce crucible cast steel. It is left to the skill of the man who examined the blister bars to determine to which temper a particular bar belonged."

A simple method of testing has been devised by Dr. Hatfield by which it is possible to determine if the finished blade has been made from shear or cast steel (Cutlery, Stainless or Otherwise, p. 13). It is not necessary to go into the point in detail here; nevertheless this test is important because for surgical uses cast steel is unsuitable. The properties and composition of shear steel are determined by chemical analysis. The best quality contains, in addition to iron, carbon 0·80–0·95 per cent., manganese 0·05 per cent., silica 0·07 per cent., sulphur 0·01 per cent., phosphorus 0·01 per cent., and no chromium. In crucible cast steel the proportions of carbon and manganese are higher.

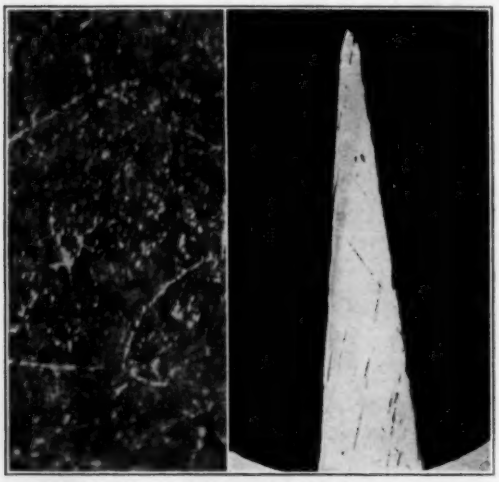
In order to ascertain how far the composition of surgical knives supplied by the trade corresponds with these figures, I had six surgical knives, obtained from as many surgical instrument-makers, chemically analysed, and the results were as follows:—

Knife:	1	2	3	4	5	6
Carbon per cent. ..	1·07	1·15	1·18	1·14	1·13	1·12
Manganese per cent...	0·26	0·145	0·165	0·195	0·39	0·215

Other constituents were found in satisfactory proportions.

It will be seen from the table above that, whilst the carbon element is fairly constant, that of manganese varies within wide limits; in fact, there is little or no evidence of standardisation.

FIG. 3A. FIG. 3B.



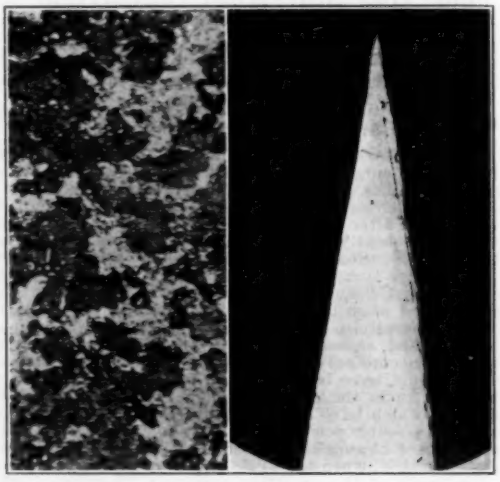
FIGS. 3A (× 500) and 3B (× 100).—This knife has been used once at an operation and has not been re-sharpened. The Brinell hardness is 630, and the structure of the pearlite is not so homogeneous as in 2A. The angle of the blade is 12°, but the cutting edge is frayed and split after use on soft tissues only.

The Hardness of Shear Carbon-Steel.

The cutting properties of knives and other sharp instruments depend mainly upon two processes which the steel undergoes—viz., hardening and tempering. When we examine steel of 0·9 per cent. carbon-content under a microscope, we observe that the section consists entirely of "pearlite," which appears to be a more or less structureless mass at low magnifications. Under higher powers, however, pearlite shows two widely contrasting appearances: First a white background, which is the iron-content, and secondly, black deposits of carbide of iron (Fe_3C), which are scattered irregularly over the white background (Fig. 1A). If the crude steel could be examined microscopically when hot it would be found more uniform in appearance, as we see when we contrast Figs. 4A and 5A. The iron in Fig. 4A has not been hardened at all. The pure iron has absorbed heat and has dissolved up most of the carbide of iron and formed a "solid solution" of hard steel in Fig. 5A.

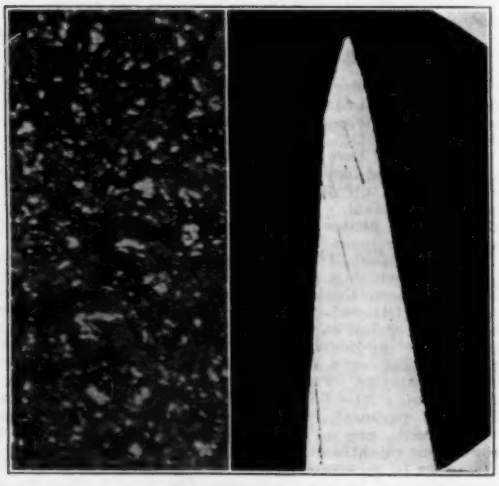
It is essential to know at what temperature this momentous change takes place in shear carbon-steel. By using a thermo-electric pyrometer, Dr. Hatfield has shown that the "critical point" of the change is 730° C. Dr. Hatfield states that "if steel is heated to a temperature at which the 'solid solution' is in existence, and is then 'quenched' in water, it is hard." In fact, it has undergone a scientific process of hardening.

FIG. 4A. FIG. 4B.



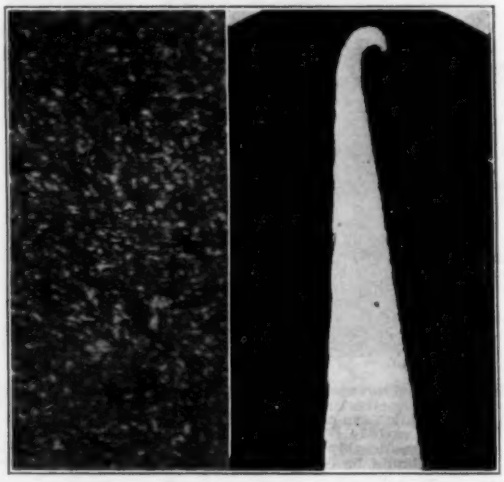
FIGS. 4A (× 500) and 4B (× 100).—This knife is as it came from the surgical instrument makers. It is a bad knife. Its Brinell index is only 270, and the structure of the pearlite (Fig. 4A) is coarse and blotchy. In fact, it is very doubtful if it has been subjected to any proper hardening and tempering processes.

FIG. 5A. FIG. 5B.



FIGS. 5A (× 500) and 5B (× 100).—This knife is an old and a cherished one. It has been in use for several years and has been frequently re-sharpened and stood the process well, as its hardness is normal—viz., 650. The angle of the blade is 13°, but the actual cutting angle of the edge is 34°, owing to indifferent grinding. In spite of the increase of the latter angle the knife was very serviceable, because of the hardness of its composition. In Figs. 7A and 7B, is seen an enlargement (× 100) of the cutting edge.

FIG. 6A. FIG. 6B.



FIGS. 6A (× 100) and 6B (× 100).—This knife has been subjected to a severe test. Its composition is not normal, as there was too much manganese present, and the cutting-angle has been reduced by grinding to 10½°, so that the knife was not able to stand the severe testing it has had in a prolonged operation on bone, and the edge of its blade has become re-curved.

Our observations, and examination of the six knives referred to above, show that the hardening is often incomplete, and has not been carried out properly. It has not been controlled scientifically by a pyrometer, nor have the results been checked either by the microscope or the "Brinell" hardness test; in fact, in one of the knives no hardening at all appears to have been attempted (see Fig. 4A).

The Brinell ball-hardness test† has shown that the standard hardness of a hardened carbon-steel blade should be represented by the figure 650. All sharp surgical instruments should approximate to this figure in hardness. We submitted the six trade surgical knives to the Brinell ball-hardness test.

Knife 1=546; 2=650; 3=630; 4=270; 5=650; 6=650.

Therefore knives Nos. 1 and 3 have not the requisite hardness; No. 4 has probably not been hardened at all, whilst blades Nos. 2, 5, and 6 might be expected to behave satisfactorily; in fact, knives Nos. 5 and 6 have done so. No. 5 has had 10 to 15 years' wear and tear in all kinds of operations, and has been frequently re-sharpened. Its manufacture was either on approved scientific lines or else it has acquired its hardness empirically, like the old Toledo and Damascus sword-blades. It should be noted that in blade No. 6 (Figs. 6A, 6B) the edge has become re-curved. This knife was submitted to a severe operation test, having been used in the removal of two bunions, and was often in forcible contact with eburnated bone.

The microscopic appearances of the pearlite should also be noted, whether there is or is not a nearly complete solid solution; the greater the hardness the more nearly does the pearlite approach to uniformity in microscopical sections (Figs. 2A and 3A).

Steel, however, which has been so hardened and quenched in water is possessed of internal stresses which render it brittle; in fact, it requires "tempering."

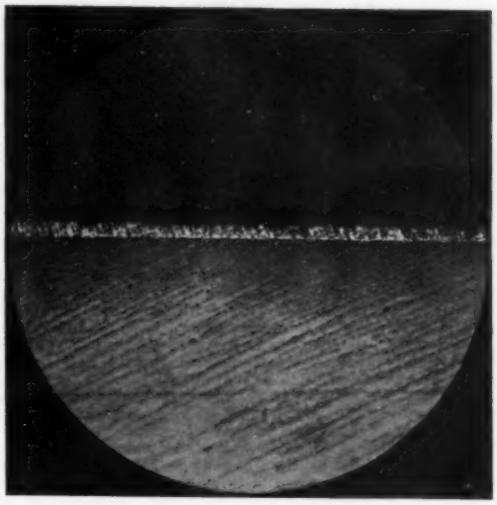
FIG. 7A.

The Tempering of Shear Carbon-Steel Blades.

The effect of this process is to remove the internal stresses left in the blade after quenching in water or oil. Tempering or re-heating the blade to a low temperature causes a slight softening by the effect of that heat upon the hardened steel blade. Proper tempering is in essence accompanied by a slight breaking down of the solid solution, and the carbide of iron begins to reappear. When this change has just commenced the blade is said to be tempered "properly," and has acquired the requisite degree of toughness for its purpose. The tempering of carbon-steel is generally done at temperatures ranging from 180° to 212° C., according to the degree of hardness required in the finished article. Surgical knives made of carbon-steel are tempered at 100° to 150° C., whilst stainless steel domestic cutlery is tempered at 180°. The process of tempering must be distinguished from that of "annealing," which means softening—i.e., as much as possible. It is true that the two processes are kindred, in that they involve re-heating to a certain temperature, but the temperature in annealing is higher than that in tempering. Further, the articles are usually cooled slowly from the annealing temperature, whereas they are usually, but not always, cooled quickly in the tempering operation.

In making a surgical knife the steel leaves the manufacturer's hands in the form of a bar; the cutler then forges,

FIG. 7B



Enlargements (× 100) of the cutting-edge of knife No. 5. In Fig. 7B the regularity of the cutting-edge is seen, and further serves to illustrate the truth that every knife-edge is a saw in miniature.

hardens, and tempers the blade, and the grinder finishes it. When the handle and blade are made from the same piece, it is only the blade which is heated to the high temperature required for hardening; the handle is left soft.

The Mode of Grinding and the Cutting Angle of the Knife.

Grinding must be done with much care and patience, otherwise heat is generated during the procedure and over-tempering or annealing sets in; this renders the blade softer than it should be and deprives it of cutting power. The secrets are to grind slowly and patiently, and to use plenty of cold water so as to avoid heating the blade. The shape to which the blade is ground depends on the purpose to which the knife is to be put. Thus, the ordinary trade blade differs in the outline of its cutting edge and the solidity of its back from an old-fashioned lithotomy knife or from one formerly used in Cock's operation.

The cutting edge of the knife when viewed in cross-section shows what is known as the "cutting angle." Referring again to the knives which were tested and reported upon, it was found that the cutting angles had a wide range—viz., from 10½° to 18°. In knife No. 6 (Fig. 6B), after use in a prolonged bone operation the edge was actually re-curved like that of a wave about to break. The measurement of the angles of the six knives were found to be:—

No. 1, 15°; No. 2, 14½°; No. 3, 12°; No. 4, 18°; No. 5, 13°; No. 6, 10½°.

It is quite clear that there has been no logical system adopted by the manufacturers in producing these edges; the best angle is 12·5°. In most knives there are two angles to be considered; the first is the cutting angle ground on the blade as a whole, and the second is the cutting angle ground on the sharp edge of the blade, the latter then becoming the actual cutting angle of the knife. Whilst the angles of the blades themselves were found to be from 10½°–18°, the actual cutting angle, owing to the activities of the knife-grinder, was found to be in one instance as high as 34°. The cutting edge of the blade has therefore been somewhat rounded off as in Fig. 5B, and such an edge will soon become blunt. The grinder should strive to keep the knife on the flat, as parallel as possible with the stone, when re-sharpening it, and be careful not to increase the angle of the edge.

All surgeons know that a knife should not be boiled, for this alters its temper and softens its cutting edge; when it encounters hard tissues it re-curves. It seems that this plea for the standardisation of surgical cutting instruments is necessary. We ought to be sure that we are buying the best article which can be made; that we can rely upon it to do its work to stand wear and tear, and that when sent to be

† Dr. Hatfield writes to me about this test: "The researches which we have done into the behaviour of cutlery of different kinds have shown that the intrinsic hardness of the blade prior to grinding is the determining factor, and we have devised a rather interesting method here of using the Brinell ball-hardness test on such thin articles. A very small steel ball is pressed into the blade under a known but always constant load. The result is that an impression is made which is smaller the harder the steel. By dividing the area of the impression into the load we have the means of getting a definite quantity which can be compared with a standard, and as a matter of fact we have correlated our values with the standard Brinell scale."

sharpened and "set" it shall be returned to us with a good enduring edge.

Summary.

The qualities of a good surgical knife are that it should be made of shear carbon-steel of the right chemical composition; that it should be accurately hardened and tempered; skilfully ground so as not to alter its temper; and it should have a cutting angle of 12½°. Finally, it should be able to stand much wear and tear, and after having been sent to the surgical instrument maker for repair and grinding, it should be returned to the surgeon with all its good qualities intact.

NEUROTROPIC AND DERMOTROPIC VIRUSES.

DR. LEVADITI'S SUMMARY.

THIS year's recipient of the Cameron Prize was Dr. C. Levaditi, of the Pasteur Institute, Paris, and during the summer he delivered two Cameron lectures at the University of Edinburgh. The first was devoted to Recent Advances in the Chemotherapy of Syphilis, whilst the second, of which we publish an abstract below, was entitled Neurotropic Extodermoses.

Among the ultramicroscopic viruses, said Dr. Levaditi, there is a group whose members are all similar in their general characters and in their affinity for fibroblastic tissue. This group of neurotropic and dermotropic viruses includes the following: cow-pox, vaccinia, epidemic poliomyelitis, encephalitis lethargica, herpes, and rabies. Some of these viruses, such as poliomyelitis virus, are purely neurotropic; others, such as cow-pox and vaccinia, are purely dermotropic; whilst others again, such as herpes virus, are both neutropic and dermotropic.

Epidemic poliomyelitis occurs in well-marked epidemics, and in some epidemics the cases are all associated with some particular centre—usually a school. The infectious character of the disease is therefore clear. Landsteiner and Popper and also Landsteiner and Levaditi showed tha

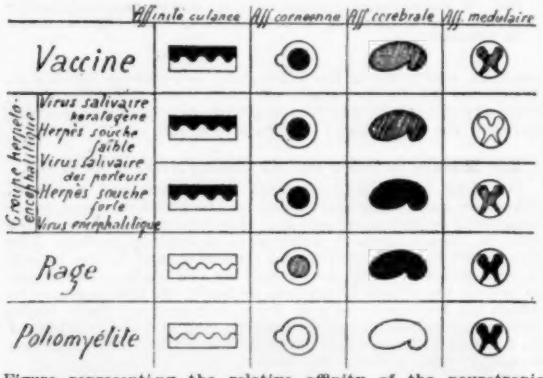


Figure representing the relative affinity of the neurotropic ectodermoses for the cutaneous and nervous systems.

the disease could be transmitted to monkeys; intracranial inoculation of monkeys with emulsions of brains of fatal cases of poliomyelitis produces poliomyelitis with typical clinical and pathological signs. One attack renders an animal immune to further inoculation, and the serum has protective properties.

Encephalitis lethargica was first recognised and named by Economo in 1918. Probably the first cases occurred around Verdun in 1915, after which epidemics occurred in Austria, Germany, France, and England in 1918, and a disease of a similar nature in Australia in 1917. The epidemic declined after 1921. Various attempts were made to transmit the disease to animals (Wienner, McIntosh, and Turnbull), and Levaditi and Harvier found that the disease could be produced in the rabbit by intracorneal inoculation of infective material. This produces encephalitis with keratitis and papular lesions of the skin. Cutaneous inoculation also results in a fatal encephalo-myelitis, the virus progressing along nerve trunks to the central nervous system (neuroprobasie).

Herpes.—Grüter and Löwenstein showed that intracorneal inoculation in rabbits of vesicular fluid from herpes febrilis produced a typical keratitis and that the infection was transmissible in a series of animals. All forms of herpes (simple, recurrent, and also the herpes occurring with some infectious diseases, are virulent for the rabbit. The virus sometimes progresses along the ciliary nerves and through the Gasserian ganglion to the brain, and there sets up a fatal encephalitis (Doerr and Vöchting). The virus is a filter-passer.

There is a great variability in the virulence of the virus and often after inoculation has produced an acute encephalitis resulting in the death of the rabbit, reinoculation from the brain of such an animal produces negative results. The neuro-infections appear, therefore, to be auto-sterilisable. Such auto-sterilisation appears to be especially common in cases with severe reactions. It appears that the presence of virus in the brain excites a severe reaction which kills the virus but also causes the death of the host.

Neurovaccine.—The small-pox and vaccinia virus show an affinity for the cornea, skin, and testes. Various workers (Calmette, Marie, &c.) sought to infect the brain of the rabbit with vaccinia virus but the results were either negative or doubtful. Levaditi and Nicolau repeated such experiments and after many trials and alternate passage of the virus from the testes to the brain of the rabbit and vice versa, succeeded in obtaining a stable neurovaccinal virus. Intracranial inoculation of the rabbit with this virus produces typical clinical and histological signs. The guinea-pig, mouse, calf, and monkey also are susceptible to the virus. Cutaneous vaccination against small-pox in man has been practised with this virus in France (Levaditi and Brindeau), and in Spain (Gaillardo and Gonzales). In Spain 2 million vaccinations have been performed with the neurovaccine cultivated in the brain of the rabbit. The results have been excellent. The proportion of successful vaccinations has been remarkably high, often reaching 95 per cent. No ill-effects, either cutaneous or nervous, have been observed.

The advantages of the preparation are that it can be obtained in laboratory animals, free from the contamination with pyogenic organisms present in the ordinary vaccine lymph. The virulence of the virus is very stable and the virus retains its virulence in glycerine for 205 days. It is active at a dilution of 1 part in a million. The virus has a marked affinity for the ectodermal tissues (namely, the skin and the central nervous system), but also can grow in the testes and ovaries.

Classification of the Neurotropic Ectodermoses.—The neurotropic ectodermoses can be arranged in a series according to their relative affinity for the cutaneous and nervous systems. This series is shown in the diagram above.

FREEMASONRY AND MEDICINE.

AT the quarterly meeting of the United Grand Lodge of English Freemasons, held in Birmingham on Sept. 5th, Brigadier-General Charles S. Wilson, the District Grand Master of Egypt and the Sudan, presented to Grand Lodge a maul which had been found in the tomb of Zoser, a Pharaoh of the Third Dynasty, at Sakkara. Competent Egyptologists declared that the maul was certainly not more modern than 1'00 B.C., and it might date from any time back to 2500 B.C. The funeral temple in which it was found was believed to be the first building erected in stone. It was built about 2900 B.C. by I-em-Hotep, the prime minister, who became Egypt's medical god. Lord Ampthill, in accepting the gift, said that the maul was far older than anything now in the museum of Grand Lodge. Further reference to I-em-Hotep will be found in a letter from Mr. Richard Kershaw, which appeared in THE LANCET (1925, ii., 1002).

We take the opportunity of mentioning that Mr. R. E. Sare, the manager of THE LANCET, was installed on Sept. 24th Master of his Lodge, St. Bride, No. 2817, which was founded in London in 1900.

HEALTH OF OFFICIALS IN WEST AFRICA.

THE issue of a new pamphlet [1] of vital statistics regarding non-native officials in West Africa is a reminder that this strip of tropical country is not now the white man's grave which it was once. During the year 1927, when an average of 3637 officials were serving, 56 were invalided, 31 pensioned, and 36 died, while a total of 366 left the service at an average age of 39 with an average length of service of eight years. The shortness of the period of service is explained by the fact that officers of the Frontier Force return to the British Army after, at most, three tours of service, that until recently the majority of nursing sisters were not permitted to serve more than two or three tours, and that many technical officials are engaged on special work for short periods. Eight deaths were due to violence—namely, 2 from suicide, 3 from motor accident, 2 from drowning, and 1 from other accident, leaving 28 deaths due to disease, or a rate of 7·7 per 1000, being the third lowest recorded. The certificated causes of these deaths were as follows: Blackwater fever, 3; malaria, 1; cerebro-spinal meningitis, 1; septicæmia, 2; blood poisoning, 1; pneumonia, 4; cerebral abscess, 1; nervous exhaustion, 1; asphyxia, 1; bronchial asthma, 1; septic endocarditis, 1; acute nephritis, 1; acute pancreatitis, 1; septic peritonitis, 1; intestinal hæmorrhage, 1; operation for duodenal ulcer, 1; acute gastro-enteritis, 1; carcinoma, 4; operation for cyst, 1.

[1] Crown Agents for the Colonies, 4, Millbank, London, S.W. 6*d*.